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ACORN USER

NOVEMBER 1987

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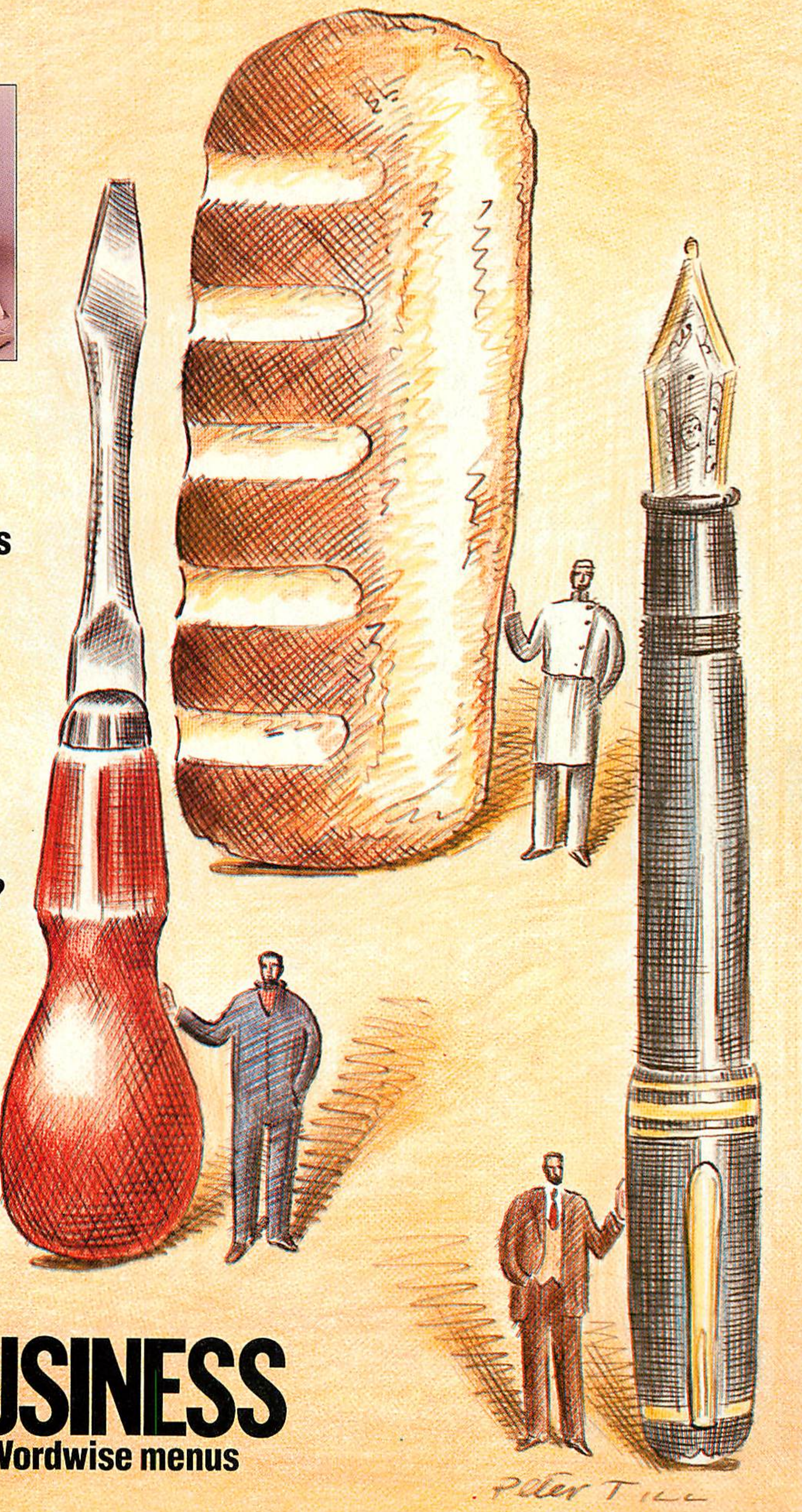
Newspaper competition

TOOLKIT:
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Mastering recursion



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5¼ Unbranded Discs

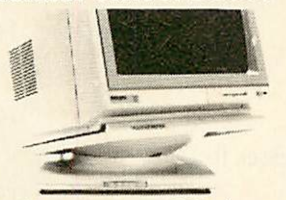
SS/DD	9.65	22.45	41.40	97.10	181.13
DS/40T	10.95	25.00	45.55	105.25	193.20
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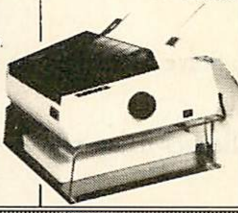
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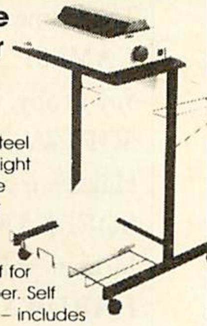
5mm perspex

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400 x 310 x 100mm
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132 Column Version
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Rugged steel frame. Height adjustable basket for output paper & base shelf for input paper. Self assembly – includes castors.

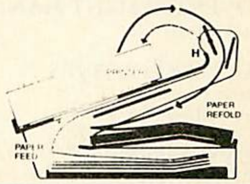
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GP100	7.40	14.15	26.20
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Star NL10	18.60	36.60	71.10

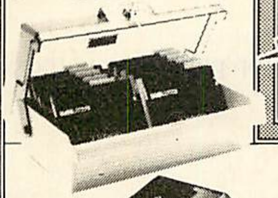
Colours available –
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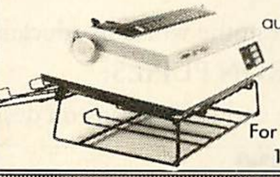
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1 12.55
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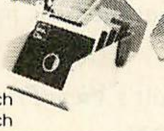
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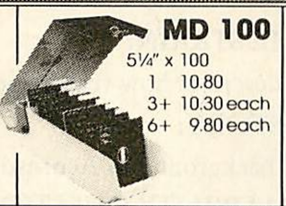
MD 50

5¼" x 50
1 7.80
3+ 7.40 each
6+ 7.10 each



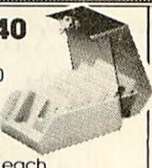
MD 100

5¼" x 100
1 10.80
3+ 10.30 each
6+ 9.80 each



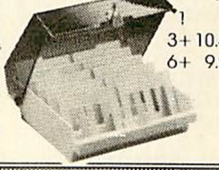
MM 40

3½" x 40
1 8.30
3+ 7.90 each
6+ 7.50 each



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3+ 10.40 each
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89x36	5.65	14.25
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ACORN USER

ISSUE No 64 NOVEMBER 1987

NEW USERS

REVIEWS

EDUCATION

BUSINESS

REGULARS

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ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

COVER



Illustration by Peter Till

NEXT MONTH

Graphics special: Successful computer artists tell us their secrets, Joe has written a CAD program, We look at monitors and the role of information technology in schools

ARCHIMEDES 300 SERIES

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0195G BBC 310 Colour System	1236.25	

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0271D I/O Podule	T.B.A.	T.B.A.
0272D MIDI add-on to I/O	T.B.A.	T.B.A.
0425B Archimedes Printer lead	10.47	9.95
0505G Multi-Sync Taxan Mon.	668.42	635.00

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0201B Compact RS232 Interface	29.90	28.41
0211C PAL TV Adaptor	29.90	28.41
0250C Compact 5.25" Disc Lead	12.32	11.70
0298B Compact Printer Lead	9.77	9.29

0240C M128 Manual 1 ADJ22	14.95	14.20
0241C M128 Manual 2 ADJ23	14.95	14.20
0242C M128 Adv. Ref Man.	19.00	18.05
0234B M128 Econet Module	48.88	46.43
0235B M128 Eprom Cartridge	15.18	14.42
0781B Care Elec. Cartridge	8.95	8.50
0782B Care 4 Way Cart.	14.95	14.20
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0230C 65C102 6502 "Turbo"	119.00	113.05
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0217B 1770 Disc Interface	50.24	47.73
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0502G Taxan KX119 Amber	100.00	95.00
0503G Zenith 123 12" Green	83.00	78.85
0530G Microvitec 1431 Mon.	239.00	227.05
0531G Microvitec 1451 Mon.	289.00	274.55
0505G Multivision 770 Plus	668.42	635.00
0535G Supervision 625 RGB	379.50	360.53
0536G Supervision 620 RGB	318.55	302.62

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0610F Cumana CS100 40	126.50	120.18
0614F Cumana CS100E	118.45	112.53
0601G Cumana CDX200 40	215.00	204.25
0602F Cumana CSX400 40/80	142.60	135.47
0603F Cumana CS400 40/80	162.15	154.04
0615F Cumana CS400E	155.00	147.25
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0740B Aries B12 ROM Board	46.00	43.70
0749B Aries B12C Adaptor	5.87	5.57
0704B ATPL ROM Board BBC	39.67	37.69
0746B Ditto for BBC B+	33.35	31.68
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C

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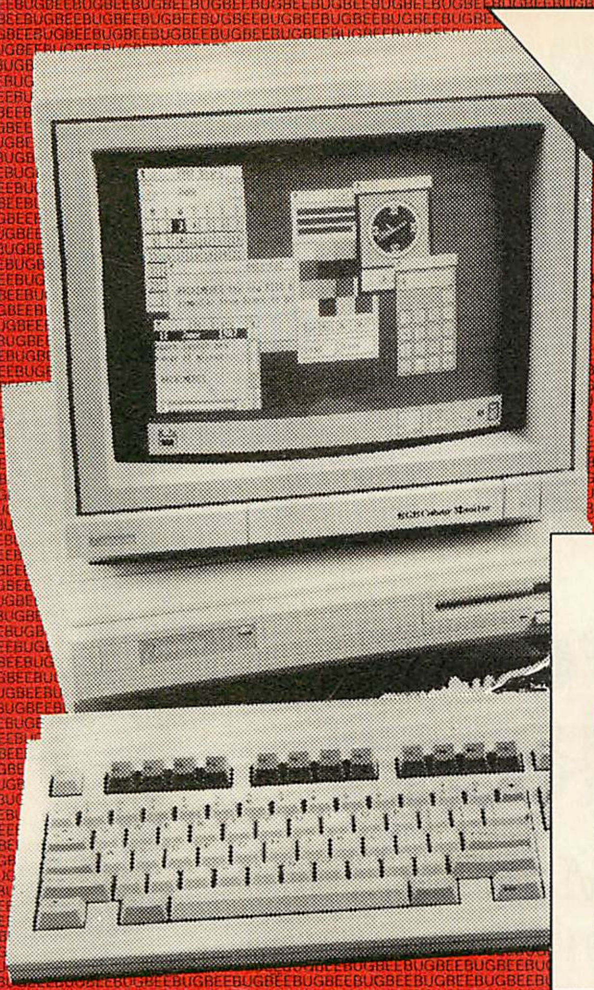
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U.K. carrier delivery £7

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0198G	Compact TV System	390.00	370.50
0199G	Compact Entry System	375.00	356.25
0200G	Master 128	435.91	414.11

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________Post Code________
Signature________

Archimedes 300 Series Now Available Ex-stock

NEWS

Cub alteration 'unsatisfactory'

Microvitec has issued a stern warning to people who want to fiddle with its monitors' electronics to make them work with the Archimedes.

The statement follows an article 'published in the technical press' which suggested modifying some of the circuitry in Cub monitors to convert them to the linear RGB which the Arc uses. Cub monitors use standard TTL RGB signals.

In addition to the danger of frying yourself with the high voltages found inside monitors, Microvitec claims that 'the modification is in itself unsatisfactory and anyone using a monitor modified in this way will not obtain the usual high quality of display.'

The Acorn monitor supplied as standard with the Arc is a Philips model which accepts both linear and TTL RGB signals. And Microvitec itself produces the MS/1455 model which works with the Archimedes without any modification.

Upbeat upgrade

A range of new sounds have been added to the Rice Digital Drum system. You can have hand claps and echo effects as well as the existing sounds, and the optional bass synthesiser now has four different sounds and variable picking strength.

The software has also been converted from Basic to machine code, making it faster and more reliable. The cost of the unit is £47.50, or £85 with the bass synthesiser and sequencer software.

Arc obeys school rules

By Bill Penfold

Acorn's Archimedes could become the cost-effective answer to educationalists' dreams.

An exaggeration? Not according to recent guidelines from the Department of Education and Science on what to look for when buying classroom computers.

Whitehall's criteria match the specifications of the versatile Archimedes. In fact, says the DES, versatility is a requirement teachers and local education authorities should look for in future purchases.

Compatibility with existing school software and commercial systems, plus having the potential for software portability is stressed.

In addition the DES is emphasising the need for classroom computers to be upgradable to incorporate new standards as they are developed, have plenty of interfaces for use with peripheral devices, and be able to withstand wear and tear.

The 'buyers guide' is a chart contrasting the features of 19 machines. Only the Nimbus VX range scores higher than the Archimedes – but at about three times the price.



Arc: best at the price

The authors state that systems should be 'of an open design providing a path for future upgrading and the incorporation of new standards as they develop.' This includes expansion slots for second processors and the ability to emulate other computers.

New systems should offer access to much of a school's existing software, be able to use languages such as Logo and structured Basic while also offering access to MS-DOS.

Though schools will probably not yet have pressing needs for C and ISO-Pascal compilers, the guidelines suggest they soon will and these languages should be available as, indeed, they are for the Arc.

The provision of a WIMP environment is seen as valuable. A dozen different interfaces are also suggested to make full use of existing and potential new peripheral devices. These include a separate printer port, a serial interface port to RS232C standard or compatible, and an analogue port for control.

The experts also suggest there should be interfaces for two floppy drives plus a hard disc and an interface capable of accepting a MIDI music, system. Potential for networking and for interactive video applications are also necessities.

Finally, to get the gold star for classroom computing, the experts advise that plugs and sockets should be gold plated to withstand frequent connection and disconnection.

Dragons descend on Surrey

Hideous hordes of babbling orcs and elves will be gathering in the dank dungeons of darkest Surrey this November.

Well, not quite dungeons. It will actually be Sutton Central Library, which is the venue for the second National Computer Adventurer's Convention. This takes place on Saturday November 28, and features seminars on multi-user games, adventure creators and the future of adventuring. There will also be program demonstrations and advice available.

The price is £2.50 on the door. Contact David Wilkins on 01-642 3102 or Prestel mailbox 016423102.

Free software with CAD pack

The latest CAD package from Bizzell Computers combines a Tandy plotter with digitising and CAD software. The *Micad* drawing package is included free of charge. The total cost of the system is £400. For more information contact Bizzell Computers on (095389) 592.

JEFFREY ARCHER

NOT A PENNY MORE, NOT A PENNY LESS

THE COMPUTER GAME



Atari ST
CBM 64
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Spectrum 48
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NOT A PENNY MORE, NOT A PENNY LESS"

Published by
DOMARK

Scripted by: Robin Waterfield. Programmed by: Imagitec Design Ltd. Domark Ltd., 22 Hartfield Road, London SW19 3TA. 01-947 5624.

News in brief

■ *SIR*, the *Schools Information Retrieval* database published by the BP Educational Service, is now available on the BBC micro. The program is intended to teach secondary school students how to create and use a database system.

To promote the package, which costs £30, a workshop has been organised with Bedfordshire LEA. BP hopes that up to 40 users will attend and bring plenty of ideas for extending the use of *SIR*.

■ Acorn users in industry can improve their efficiency in programming and machine use with an off-line computer numerical control system from CyNCro Ltd. A full installation, including a dual-drive Master with mono monitor and printer, costs £3444.25. Training and software are provided and the package can be customised to include other peripherals such as plotters.

■ T K Boyd has come up with an answer to paranoia and insecurity among network users. For £13 he will send you a file encryption program to render *View*, *Wordwise* and Basic files illegible to everyone except the person with the decryption code. He is so confident about the security of the system that a prize awaits the first person to crack it.

■ Electron owners can now upgrade to a 3.5-inch disc for £99. Advanced Computer Products has launched the Advanced Plus 3, which includes a 1770 interface, ADFS, a 3.5-inch drive, a Welcome disc including utilities and a games disc, including the perennial favourite *Snapper*.

The Advanced Plus 3 differs from the original in being smaller – it consists of a cartridge to attach to the Plus 1 upgrade, and a cable to the disc drive – and in having a spare ROM socket. It is also easy to upgrade to the Advanced Plus 4.

Acorn 'disappointed' by £1.4 million loss

Acorn managing director Brian Long described a £1.4 million loss in the first half of this year as 'disappointing'. The loss compares to a small profit in the same period last year.

The results reflect the costs of developing the Archimedes range, but this investment should begin to pay off in the second six months of the year.

Sales of existing products like the Master 128 and Compact were down slightly, in line with industry trends, but had held 'surprisingly well' in education.

However, showing the Archimedes to selected local education authorities in the spring affected Master series sales, as people waited to see the new machine. The uncertainty caused by the General Election was blamed for delaying educational purchases.



Long: Unix plans

The future looks much rosier – growing Archimedes sales are expected to exceed Master series revenues early next year.

As reported last month, Acorn and Olivetti continue working on an upmarket ARM-based workstation to run the Unix operating system. This is aimed squarely at the university market currently dominated by Sun and Apollo workstations. The machine is planned for release in mid-1988, and will include a built-in arithmetic co-processor based on the Western Electric 32206 chip. This will vastly speed up floating-point, trigonometric and logarithmic calculations as they are performed by hardware rather than software routines.

The Unix software will also be available for the Archimedes 400 series, but will require some hardware upgrades, in particular a hard disc and extra memory capacity.

Archimedes takes on the Minotaur

Minerva Systems has announced an Archimedes game, *Minotaur*. As the name suggests, it is a maze game. You have to rescue 10 fellow Cretans from the three-dimensional maze and its inhabitant the Minotaur. Littered around to help you are food, drink and segments of map.

Each time the game is loaded it will create a new random maze, increasing the long-term appeal of the game. You can also save a maze to disc, and complete it later by saving all your men, and then going in again to fight the beast himself.

'Maze games have been around a long time' said a Minerva spokesman. 'How different this one is is a matter of opinion. It is certainly a good advertisement for the machine.' *Minotaur* costs £15.

■ Minerva has also announced the first of a range of add-ons for *InterBase* similar to their established *System Delta* range. *Interbase* is Computer Concepts' database manager and is reviewed in this issue.

InterBase has been criticised for being difficult to program, but the new applications should be simple enough for non-technical users. Minerva's Card Index application is more flexible than the one provided with *InterBase*, with much easier printout options.

Card Index will be available from Minerva or Computer Concepts themselves, price £30.

Award for micro ideas

Is the spirit of innovation alive and well in Britain? *The Guardian* isn't sure, and so is hosting a competition for computer innovators ready to compete with technology from abroad.

You have until November 11 to submit entries to the Guardian Innovation Challenge. Any new method or device can be entered in five categories; data security, man/machine interfaces, connectivity, social benefits and 'any other'.

Individual and group entries will be accepted and there is an award for the best schools entry. The overall winner will receive £1,000, and see his/her entry commercially developed by one of the nine companies overseeing the competition. Details of the competition are available on (0895) 72617.

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Wish you were here

Special report
by Sam Greenhill

Grendon Hall, a Queen Anne house in a sleepy Northamptonshire village, is not the sort of place you would expect to find bristling with computers.

Yet behind the picturesque sandstone walls, there are dozens of youngsters hammering away excitedly at their micros.

For three weeks in the summer Grendon Hall plays host to Computer Park, a holiday designed for anyone interested in computers. It is run by a team of dedicated but somewhat unconventional enthusiasts.

An electronics workshop has been set up too, and a lot of people abandon their computers to try it out. About half a dozen of the participants worked in there full time, while others popped in and out.

Most people, including myself, spent their week learning as much as possible. Every day there are workshops on various aspects of computing, including machine code, graphics, and special applications.



Computer Park: even the computers make new friends

There are demonstrations, which centre on using computers to control equipment. One used a BBC micro to control a polystyrene cutter producing letters of the alphabet.

But most activity is centred around the projects. For example, this year there was one 12-year-old boy building a weather station, with a computer to record the results. There was also an adult building a humanoid robot.

On the first day, everyone is assigned a supervisor. Each supervisor has about four people in his group and spends equal time with each person during the week. This way you get one-to-one tuition.

Computer Park's main boast is that it has more computers than people. Although most of them are BBC micros, there are others, too, and next year there should even be a stock of Archimedes.

Computer Park serves beginners' needs extremely well.

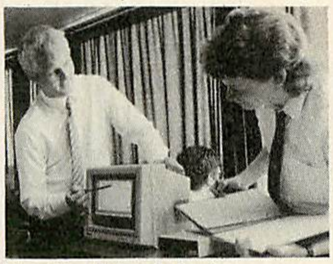
The price, around £200, includes everything from accommodation and meals, to tuition and excursions.

Atoms, electrons and the BBC B

Helping students explore the heart of the atom is the aim of a new software package produced by the UK Atomic Energy Authority.

Developed with the co-operation of the Computers in the Curriculum Project at King's College London, the *Nucleides Database* covers most of the important concepts in nuclear physics.

The package, which has been field-tested in the North, is aimed mainly at sixth-form students, but should be useful in introductory courses at colleges and universities. It covers topics such as half life, binding energy and mass defect. The information is available as either text or graphs.



Teaching A-level physics

Teacher's notes are included in the package, which sells for £12.50. It works with all versions of the BBC micro and is network compatible.

Modem demo

Tandata has set up an on-line service just so people can see how good its modems are. The system is a database designed to show the speed and error handling of the company's Tm722 modem, which works at 1200 or 2400 baud and is fully Hayes compatible.

As well as being fast, the modem uses special protocols to detect and correct any transmission errors. The database is available on (0684) 892424, but you'll need a matching Tm722 modem to appreciate it.

Dungeon design

If you like adventures but are bored with all the commerical games, you could always write your own.

ALPS, from Summit Software, is the latest adventure creation system for the BBC micro. The name stands for *Adventure Language and Programming System*. It's a chip-based program, with supporting disc or cassette, which provides routines for producing machine code adventures.

There's space for up to 255 locations and 180 objects. A text compression routine squeezes the file down to a more manageable size – around 60 per cent of the original.

ALPS includes a text editor which boasts proper text formatting. Summit Software claims that this allows you to produce neater text than with other similar systems.

Extensions to the system are already being worked on. These include a utility to allow you to read in disc-based text.

The package costs £28.95 (disc) or £27.95 (cassette).

Mice modified for the disabled

At the *Acorn User* show, representatives of the Spastics' Society managed to persuade a couple of manufacturers to modify mice and trackerballs for people who can't manage to move and hold down a button at the same time.

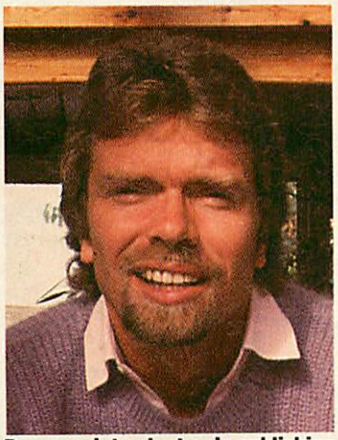
The devices now use 'latching' so that the buttons don't have to be continuously pressed. The adapted trackerball is available from Simnetts for £57, while the mouse by Challenge Research costs £30.


HD 2000
£609
MD802 F
£174
COMBO C
£235
UFD 2000
£782

Branson expands

The Branson empire continues to expand. Virgin Vision has announced the formation of a new subsidiary, Virgin Publishing, which will take on responsibility for software publishing and will be looking at other forms of electronic publishing as well.

In particular, Virgin is working on a number of interactive video projects, the first of which to be released is based on Sir Ranulf Fiennes' round the world expedition.



Branson: into electronic publishing

No doubt this subsidiary will be as successful as all the other companies Branson has launched – after all, Branson occasionally gets his feet wet but somehow never seems to get his fingers burnt.

Playing with profits

System Software, best known for its assembler package *Ade* and for the Island Logic *Music System* has moved into business simulations with the *Crisis Management* package.

Its latest software package, *Intervention,* is a decision making game in which teams of three to five set up and manage a manufacturing company.

The managers have to face all the hazards of real business, like changes in the price of raw materials and natural disasters, while having to make all the crucial decisions in the running of the company.

It's interesting that, apart from the BBC micro and Master, the software is available only on business PCs. The price of the package on the Acorn machines is £115.

News in Brief

■ Clwyd Technics has expanded its robotics and electronics range with a control card and printed circuit board designer for the Offboards system. The control card has eight input/output lines and is part of the Offboards approach of producing open-ended systems for education.

■ Yet another front end system for the Master has arrived. The new software goes by the tongue – twisting name of the *ADFS/SWR Management System*, or *ASMS* for short.

You can get *ASMS* for £16 as a ROM image on disc, or £19.50 if you want it on a chip. is designed to work with ADFS, but can be supplied on a DFS disc too.

■ European printer manufacturers are rejecting the usual way of measuring printer speeds. The companies, which include Honeywell Bull, Philips and Olivetti, have abandoned the characters per second (cps) measurement in favour of pages per hour (pph).

The cps figures quoted for most printers are misleading in that they don't take into account paper and head movements. The new system will be more appropriate to new technology like laser printers.

PHOTO: CLAY PERRY

THE COMMS COLUMN

■ Early Archimedes micros including all those shipped to software houses, have a problem with hardware handshaking on the serial port. This is making the development of comms software for the machine difficult, as no-one is able to test their software on-line.

The problem arises only when the fast Archimedes tries to send data to a slow modem. The modem cannot cope with so much data and so toggles the CTS handshake line – causing problems at the Archimedes end. File transfers from other computers are unaffected.

Acorn is aware of the problem, and I assume that it will be put right when the final 512k operating system ROMs are released with volume production machines later this year. It is hard to see how any comms software can be released until the situation is resolved.

Jim Day of BBC Soft felt that its multi-function terminal, ArcComm, scheduled for release after Christmas should not be delayed by the difficulties, but other software producers we spoke to were not even aware of the problem. It makes you wonder how far they have progressed with development work.

■ Tandata, the Malvern-based modem company have set up a dial-up test system (see separate news story). The scheme is part of the company's promotion for the TM722, its new V22/V22bis (1200/2400 baud) modem, which at £499 + VAT is very competitive, provided you don't want the slower V21 and V23 speeds. Virtually every system (including Prestel, Telecom Gold, and PSS) now offers 1200 and 2400 baud. Another inducement to buy this modem – for corporate users – is a free loan offer, a sort of 'on approval' system. Anyone thinking of buying at least six TM722s can borrow one for two weeks.

■ After escaping lightly from dissatisfied customers by restoring regular mailbox availability after months of patchiness, Prestel is once again upsetting its users.

Page *92#, where your current bill is shown, has been altered to remove the cumulative quarterly totals. It now shows only the bill for your current call. Many people are complaining about this, saying that the cumulative totals were the only way to know if your account had been hacked, prior to receiving your quarterly bill.

Prestel says that the new system is a precursor to a more advanced billing information system to be introduced soon on printed bills, and in the future online. The Prestel chatlines are, full of mutterings about complaints to OFTEL and subscription cancellations.

■ This month our bulletin board spotlight falls on the Gnome at Home. This got a viewdata board has long been regarded as the premier private viewdata system. It was on special software written by the people who wrote the Acorn Prestel ROM and Commsoft software.

The board is hosted on an Econet with 20Mb hard disc, and contains lots of BBC articles, free telesoftware, and many separate message sections, including a private mail system for subscribers. The Gnome at Home is on 01-888 8894 (two lines), with another four lines on a private number for subscribers.

David Atherton



BBC Compatible Disc Drives

MD400B – Single 400K drive 40/80 track switchable, Double Sided, with PSU

MD400F – 3.½" Single 400K drive, Double Sided

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Contacts

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Bizzell Computers, Walnut Tree House, Forncett St Peter, Norwich NR16 1HR. Tel: (095389) 592.
T K Boyd, Seaford College, Petworth, West Sussex.
Clwyd Technics, Antelope Industrial Estate, Rhydymwyn, Nr Mold, Clwyd CH7 5JH. Tel: (035283) 751.
Challenge Research, 218 High Street, Potters Bar, Herts EN6 5BJ. Tel: (0707) 44063.
Computer Concepts, Gaddesden Place, Hemel Hempstead. Tel: (0442) 63933.
Computer Park, 25 Bridge Street, Rothwell, Kettering, Northants NN14 2JW. Tel: (0536) 712627.
CyNCro 11-15 Oakland Road, Leicester. Tel: (0533) 709202.
Minerva, 69 Sidwell Street, Exeter EX4 6PH. Tel: (0392) 37756.
Rice Computers, PO Box 2, Morecambe, Lancashire LA4 4PP.
Simnett's, Unit 15, St George's Industrial Estate, Richmond Road, Kingston Upon Thames KT2 5BQ. Tel: 01-541 1495.
Spastics Society, 840 Brighton Road, Purley CR2 2BH. Tel: 01-660 8552.
Summit Software, 58 Oakdene Park, Craigavon BT63 5SB. Tel: (0762) 42510.
System 5th floor, Sheaf House, Sheaf Street, Sheffield S1 2BP. Tel: (0742) 768682.
Tandata, 50A Pall Mall, London SW1Y 5JQ. Tel: 01-839 3157.
UKAEA, 11 Charles II Street, London SW1Y 4QP. Tel: 01-930 5454.
Virgin Vision, 328 Kensal Road, London W10 5XJ. Tel: 01-968 8888.

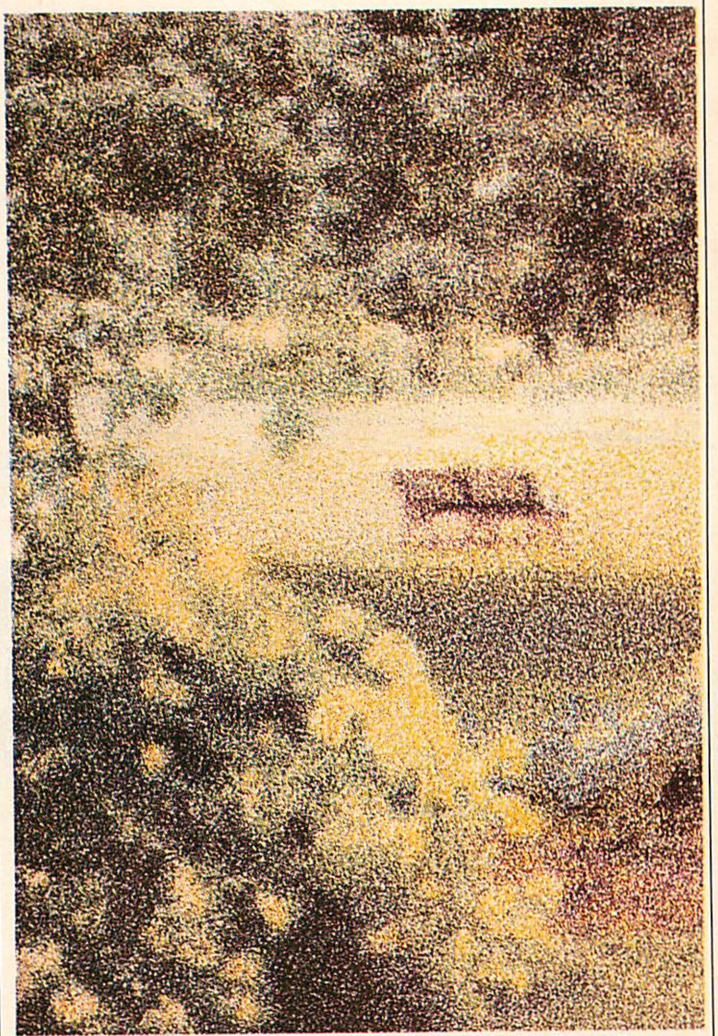
December graphics special

The December issue of *Acorn User* is a computer graphics special. Graphic artists Jonathan Inglis and Paul Bayley give the benefit of their experience with some advice on improving your drawing.

Brian Larkman examines the work of computer artist Karl Torok, whose distinctive style harks back to the Pointillist work of Seurat.

Joe's Jottings next month describes a program to design circuit boards.

Filing systems are Tessie Revivis' subject in First Byte. Nick Evans and Chris Drage explore the potential of information technology in the classroom.



An example of Karl Torok's art, featured in next month's *Acorn User*.

Blunderbox

As many of you correctly pointed out, there is a misprint in October's competition. In question 1, '1542' should read '1642'. Sorry. And the checksum in Acorn Forum listing 5 applies only to the BBC model B. If you have a different computer, change line 1370 to say just '=TRUE'.

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Acorn User has a guaranteed fast reply service for enquiries. Your answer will be returned within 10 working days for just £3 (includes VAT), or your money back.

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COMPETITION

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Could you be a newspaper magnate? We want you to have a go, and perhaps win an exciting Archimedes micro in a competition run by *Acorn User* and leading software house AMS.

The aim of our competition is for you to produce a new national newspaper. In fact, you have to consider the whole process leading up to the launch of a paper, from planning to printing a 'dummy issue'.

The competition will be judged in three age groups: under 14, 14 to 18, and over 18. Entries don't have to be from individuals: groups of people or even a school can enter. The judges will be Nick Pearson, managing director of AMS, *Acorn User's* Tony Quinn, and a senior journalist from the national press. They will be judging the entries on the technical merit of the newspaper and how well you have used the facilities of the software. But most important will be the journalistic quality and editorial content of the paper.

The prizes will be over £250 worth of AMS software for the best entry in each age group – *Super Art, Extra Extra, Max, Design* plus a new mark 3 AMX Mouse. The overall winner will receive an Archimedes 305, the acclaimed new BBC micro, complete with monitor.



The Arc could soon be yours


THE INDEPENDENT

Iranians avert UN weapons embargo threat

Sharp fall in jobless total cheers Lawson

South Africa plans mixed communities

Arms deal looks close as talks go into extra time

Sherman defends Le Pen invitation

Anderton supports castration for rapists

***The Independent*: Newspaper of the year**

New newspaper

There's lots of advice available to help you with your newspaper. The June 1987 issue of *Acorn User* contained a number of articles on desktop publishing, and there were useful tips in the August issue too. The education section this month discusses how publishing software can be used in school.

The first thing to tackle is a synopsis defining your target readership. This is a list of the types of stories that you want to cover in your newspaper. Should it be hard-hitting and investigative? Entertaining? Report lots of gossip? Or just hard news? Work out who your readers should be and think about what makes your paper new and different. Try to work out what the contents of a typical issue should be to appeal to those readers. Remember this should be a national newspaper although it could aim at a major specialist group like schoolchildren, teenagers, sports enthusiasts or motorists, for example.

Now plan which parts of the paper should go where. Most of the quality national dailies stick to a strict formula and following a similar plan is a good idea.

We would like you to produce the front page, plus any one of the inside pages that you've planned. The front page should of course include the title of your newspaper, the main news stories you wish to report, and an index to the rest of the paper. News stories should be original and topical. They should display balance and judgement, and have true journalistic value.

The inside page can be from any part of the paper. Again, take as much care over the editorial content as over the page layout.

You can use any of the desktop publishing packages for the BBC micro range – another way is to use a wordprocessor and a graphics package. They only stipulation is that all the software must be run on the BBC micro, Master or Compact with any printer, but a laserprinter isn't allowed.

The pages of your newspaper should be about A3 size, that's 42cm by 30cm – in other words like *Today* or the *Daily Mirror*, a 'tabloid'. It means you'll have to use more than one 'page' from a desktop publisher to make up each page of newspaper; probably four or five 'pages' stuck together will look best. You could even try a broadsheet like *The Independent*.

The pictures can be produced on a BBC micro, using an art package, or they can be real photographs, or you can cut them out from other magazines or newspapers. Of course, you should make sure they are relevant to the stories you have written.

How to enter

To enter, send us your synopsis (no longer than two pages of A4), the list of typical issue contents, and of course the two complete pages from your newspaper. Don't forget to include your name and age, or your school class, and an address and daytime telephone number. Entries should be sent to *Acorn User* at our new address, Redwood Publishing, 20-26 Brunswick Place, London N1 6DJ. Please include suitable packaging and postage if you want your entry returned. Closing date for the competition is February 29, 1988. Judging will take place in March, and the judges decision is final.

An Acorn User *reader offer for* AMX Stop Press *and the AMX Mouse, offering a £10 saving, it on page 46.*

TWILLSTAR COMPUTERS LTD

Computers



ARCHIMEDES
HIGH PERFORMANCE COMPUTER SYSTEMS

Archimedes systems use the Arthur operating system, a new version of the BBC Micro operationg system. BBC BASIC is replaced by a new extended version, BBC BASIC V. The speed and power of Archimedes allows the programmer to exploit RISC architecture with a range of high level languages for scientific engineering and business uses. In addition to BBC BASIC V, Acornsoft's development languages include C, ISO-Pascal, FORTRAN, Lisp and Prolog. The Acornsoft Software Developers Toolbox provides utilities to simplify program development and debugging; while an extensive Software Developer's Debug Tool facilitates high level leanguage deelopment in C, Pascal or FORTRAN. All Archimedes Systems have a floating point emulator as standard. On the 400 series, complex mathmetical calculations can be further enhanced by the addition of a floating point unit (FPU). All machines have feature: 32 bit RISC technology – BM enhanced style keyboard with 3 button mouse – BBC Micro style operating system (Arthur) – BBC BASIC V – interfaces; printer, serial, monitor, stereo sound – ECONET plug-in option – a variety of podules can be fitted. Archimedes is an open system and its flexibility is achieved by fitting any of the following podules (peripheral modules) via a back plane: hard disk controller (300 series only) – ROM extension board – MIDI music interface – MS-DOS co-processor – SCSI – hardware floating point unit – Ethernet podule.

THE 300 SERIES Consists of two models, Archimedes 305 0.5 Mbyte of RAM and Archimedes 310 with 1 Mbyte of RAM. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES Offers increased expansion capabilities. The Archimedes 410 has 1 Mbyte of RAM. 1 Mbyte (unformatted) 3½" disc drive, a hardware floating point unit option, a co-processor bus, a hard disk controller, a four socket back plane, 512 Kbytes of ROM. At the top of the range is Archimedes 440. This machine possesses all the features of the 410 as standard, with the adoption of 4 Mbytes o: RAM and a 20 Mbyte hard disk.

305 BASE AKB10	918.85
305 & mono monitor	976.35
305 & colour monitor	1148.85
310 BASE AKB15	1006.25
310 & mono monitor	1063.75
310 & colour monitor	1236.25
410 BASE AKB26	1608.85
410 & mono monitor	1666.35
410 & colour monitor	1838.85
440 BASE AKB20	2643.85
440 & mono monitor	2701.35
440 & colour monitor	2873.85
Archimedes/Master Econet	49.99
0.5 MB RAM	102.35
Floppy disk	143.75
20 Mbyte hard disk & podule (300 only)	573.85
Podule Backplane	40.25
ROM Podule	TBA
I/O Podule	TBA
MIDI add-on to I/O	TBA
A series reference manual	£19.95

MASTER 128

Complete With Internal Software	£399.00
Master Turbo Upgrade	£113.95
Master Econet Module	£46.00
Master ET	£349.00
Master 512 Upgrade	£217.35

The Master 512 upgrade board incorporates the Intel 80186 processor, plus 512K bytes of RAM. Digital Research DOS+, which is copyable with both MS/DOS version 2, and CP/M 86, allows you to run a large proportion of the most useful programs available. A dual 80 track disc drive is required to run programs on the 512. Provided free with 512 upgrade board are three GEM packages, GEM Desk Top, GEM Write, GEM Paint.

UNIVERSAL SECOND PROCESSOR

This allows you to connect co-processor boards designed for the Master Series to your BBC Models B or B+. Fitting a Turbo board boosts the BBC's already rapid performance to twice the speed of the standard processor. Fitting the 512 co-processor converts the BBC micro into a 16 bit machine, opening up new possibilities within the world of MS-DOS and CP/M 86. **£86.25**

Eprom Cartridge	£14.95
Reference Manual Part I	£14.95
Reference Manual Part 2	£14.95
Acorn Teletext Receiver	£108.00

FILESTORE

Filestore provides shared access to file and printer services on Econet. The filestore consists of two units – a dual 3.5 inch floppy disc unit 1.2 Mbytes of storage (Filestore EO1) which can be expanded with a high performance 20 Mbyte Winchester disk drive unit (Filestore E20).

FILESTORE EO1	£952.00
FILESTORE E20	£829.00

ECONET ACCESSORIES

100m Cable	£89.00
Station Lead Set	£29.00
Econet Starter Kit	£99.00
Econet Bridge	£199.00
Level I Fileserver 40 Track	£99.00
Level 2 Filesaver 80 Track	£235.00
Print Server Eprom	£49.00

BBC Upgrades

64K Upgrade Kit	£39.95
17/70 Upgrade Kit	£49.94
ADFS ROM	£29.95
Disc Upgrade Kit	£65.00
Econet Upgrade Kit	£49.00
DNFS ROM	£20.00

WORD PROCESSING SPECIAL PACKAGE

PACKAGE 1

Based on Master 128. The Twillstar All in One Word Processing Package contains a Master 128, View 3.0, Viewsheet, High Res Green Monitor, 800K Dual Drives with PSU, Quendata Daisy Wheel Printer together with a box of Discs, Paper, and all the Cables. **£899.00**

PACKAGE 2

Based on Master Compact 128. The Twillstar package includes Compact 128, latest version of the View Word processor, single 640K disk drive, monochrome monitor, correspondence quality printer. All connecting cables for above and also 5 disks and some paper. **£635.00**

BBC Master Compact

Twillstar continues to offer the MASTER COMPACT for your Home Education and Business needs! Complete with bundled software and an integral 3.5" Disk Drive in the following Systems:-

ENTRY SYSTEM £360.00
128K *Single 640K Drive* * bundled software*

TV SYSTEM £375.00
128K *Single 640K Drive* *UHF Modulator* *Bundled Software*

MONO SYSTEM £412.00
128K *Single 640K Drive* * Bundled Software* *12" High Res Monochrome Monitor*

COLOUR SYSTEM £565.00
128K *Single 640K Drive* * Bundled Software* *14" Medium Res Colour Monitor*

SPECIFICATIONS: ★ Compatible with Master Series micro subset ★ 128K RAM inc 64K sideways RAM ★ 64K ROM inc 32K MOS, 16K BASIC ★ Up to 4 internal ROM sockets ★ 3.5" 640K formatted disk drive ★ OUTPUTS: Video/RGB/Printer/ Mouse or Joystick ★ Disk drive ★ (optional) Econet ★ Serial ★ 5V power from disk drive module ★ Usual 8 BBC disply modes inc. Mode 7 ★**BUNDLED SOFTWARE:** Pull down menus * Desk top inc. note pad, calculator * VIEW 3.0 * CARD INDEX * Full LOGO * BBC BASIC 4.0 * ADFS + Utils * Welcome suite * Tutorials * (1770 DFS under licence)

2nd DRIVE KIT £113.00

Monitors

MONOCHROME MONITORS

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12" hi res. P31 Green Phospher Screen. CVBS input. Audio input. Band width 20 MHz. 2000 CHRS Dispay. Adjustable viewing angle. **£79.00**

Phillips BM 7522
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Phillips BM 7542
Dedicated WD phosphor Screen monitor **£95.00**

Philips BM 7513
12" Green IBM compatible **£120.00**

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New Taxan Monochrome Screens

Taxan KX117 12" Green Screen P31	£89.00
Taxan KX118 12" Green Screen P39	£99.00
Taxan KX119 12" PUL Amber Screen	£99.00

COLOUR MONITORS

Microvitec 1431 Std Res	£201.25
Microvitec 1451 Med Res	£255.00
Microvitec 1441 Hi Res	£391.00
Microvitec 2030 Cs 20 Std Res	£425.50
Microvitec 1431 AP Std Res	£224.25
Microvitec 1451 Ap Med Res	£293.25

PHILLIPS
New from Phillips

Phillips CM8833
14" CVBS and RGB medium resolution colour monitor. IBM PC compatible. Fast blankup to enable superimposing. Stereo Audio. Ear phone socket. 600 dots x 285 lines vertical **£269.00**

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14" RGB professional med res colour. 700 dots x 285 **£289.00**

Phillips CM8873
14" RGB high resolution colour monitor Res 850 x 480 **£550.00**

Taxan Super Vision 620

High Resolution colour monitor with several unique features, at an affordable price.

SUPERVISION 620
12" RGB high resolution colour monitor. Fully compatable with IBM, Apple, BBC and most other Personal Computers. 635 x 312 line resolution. Positive or negative sync input. Text colour switchable to green, amber, white or blue or inverse white. Super high contrast tube. Optional tilt-swivel base (with clock/calendar available). Special introductory offer. **£299.00**

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Disc Drives

MITSUBISHI DISC DRIVES

User Friendly Disk Drives 100% BBC compatible slimline disc drives. All drives are supplied complete with formatting diskette, comprehensive users manual and all necessary cables. All drives are 40/80 Track switchable at the front and have two years warranty.

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MD 400A Single 400K Double Sided	£118.00
MD 802C Dual 400K Double Sided	£219.00

5¼" Drives with P.S.U.

MD 400B Single 400K Double Sided	£135.00
MD 802E Dual 400K Double Sided	£249.00

SPECIAL
MD 802D Dual 400K Drives horizontally mounted in a monitor stand to fit both the BBC B and the Master series. **£269.00**

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Source SD35 3½" disk drive, single drive **£85.00**

Source SD352 3½" dual drive **£149.00**

Supplied cased complete with cables, powered from computer. Extended two year warranty.

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Source 352S 3½" dual drive with P.S.U. **£199.00**

Source SD3545S Combo dual 5¼" and 3½" drives with P.S.U. **£249.00**

Winchester Disk Drives

WINCHESTER DISK DRIVES

Source HD20 Twillstar's 20 Mbyte winchester drive including Acorn DFS ROM complete with P.S.U. **£599.00**

Source HDP201 Twillstar's 20 Mbyte winchester drive and a 400k double sided floppy drive built in a plynth to accomodate monitor on the top and the computer underneath. Includes ADFS ROM and P.S.U. **£869.00**

Source TS10 10 Mbyte tape streamer backup unit with utilities £695.00

Othe size hard disks are available, please call for our latest prises.

Accessories

Taxan KIF 4308 buffer compatible with any Centronics interface printer **£149.00**
Further 64k upgrade available.

Printer/Computer sharers.

2 – 1	£39.00
6 – 1	£79.00

Serial and Parallel T Switches

Parallel T switch	£67.85
Serial T switch	£67.82

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Raven 5¼" rainbow colour pack of 10 in library box **£17.00**

Raven 3½" single sided pack of 10 in library box **£18.00**

Raven 3½" double sided pack of 10 in library box **£25.00**

LOCKABLE STORAGE BOXES

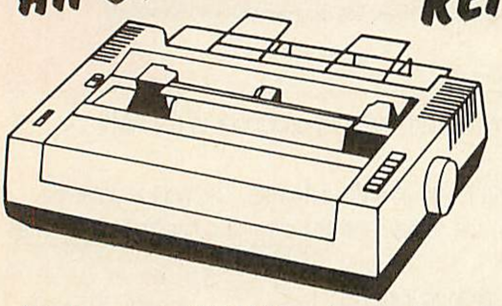
Trackmaster 5¼" 70 x 5¼" lockable	£7.95
Trackmaster 5¼" 100 x 5¼" lockable	£9.95
Trackmaster 3½" 40 x 3½" lockable	£6.95
Trackmaster 3½" 100 x 3½" lockable	£9.95

CARD DEVICES

BBC PERIPHERAL SPECIALISTS

PRINTERS

AN OFFER YOU CAN'T REFUSE!



This Panasonic KXP 1081 is the very latest in impact dot matrix printers.

It's very user friendly, with operator accessible print mode switch.

- ☆ 120 cps draft printing.
- ☆ 24 cps near letter quality (NLQ).
- ☆ Parallel interface as standard, with optional Serial interface.
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- ☆ 10, 12, 15, 17 characters per inch (cpi), italics and proportional in NLQ.
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We don't need to give away any freebees; from us you get peace of mind with 2 years no quibble warranty.

For only **£165** + V.A.T. KXP 1081

Panasonic Daisy Wheel also with 2 years warranty.

For only **£250** + V.A.T. KXP 3131.

DISC DRIVES SALES & SERVICE

Your complete answer to disc drive problems. We repair any repairable BBC disc drive. We have been repairing disc drives for nearly as long as they have been around.
Canon have appointed us to repair and service their disc drives in U.K.
Our experience speaks for itself.

Alignment, Repair and Test is **£25.00** + V.A.T. and parts when necessary

400K 40/80TK single with PSU, disc drive **£145.00** + V.A.T.

800K 40/80TK dual with PSU, disc drive **£265.00** + V.A.T.

Limited stock of the obsolete MDD 220 (40/80 400K) for any one who needs a second drive **£89.00** + V.A.T.

Winchester Hard Disc Systems, 20 MEG for only **£475** + V.A.T. while stock last

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PAPER *Plain white with micro-perf edges*

11 × 9½	60 gsm	2000 sheets	£12.50
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DISKETTES *Only quality labelled discs supplied all in plastic cases.*

per box ten

Dysan 40 TK double sided/double density 104/2D £12.00
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Maxell 40 TK double sided/double density MD 2D £11.00
Maxell 80 TK double sided/double density MD 2DD £17.50

Don't compromise on the quality of the discs you buy just to save a few pence.

PLASTIC PRINTER STANDS **£19.95** + V.A.T.

DELIVERY: 3 day courier on printers, disc drives and repaired disc drives is **£6.00** inc. V.A.T.

P&P on consummables is free.

TO ORDER: Please remit by cheque/postal order Access/Visa to: Card Devices Ltd., Padmores Yard, St. Johns, Woking, Surrey GU21 1SE.

Please allow maximum 14 days for delivery.

SALES HOTLINES: ☏ (04862) 65634/66996, Telex: 858541 CARDD G

Computers by Post

LOWEST U.K. PRICES GUARANTEED

PRINTER RIBBONS

		2+	5+	12+
ACORN	AP80	£2.70	£2.20	£2.00
	AP100	£2.70	£2.20	£2.00
AMSTRAD	DMP1	£3.90	£3.30	£3.10
	DMP2000/3000	£4.40	£4.10	£4.00
	PCW8256/8512	£4.30	£4.00	£3.80
BROTHER	HR5	£3.00	£2.80	£2.60
	HR15 Corr	£2.90	£2.50	£2.30
	HR15 FAB	£3.30	£2.90	£2.60
	HR15 MS	£3.20	£2.80	£2.50
	HR15 also for HR25/HR35			
	EP44	£2.90	£2.50	£2.30
	M1009	£3.40	£2.90	£2.70
CANON	PW1080A Black	£3.10	£2.60	£2.40
	PW1080A Red or Blue	£4.50	£4.10	£3.80
	PJ1080 Ink Jet Colour. One Off			£10.90
	PJ1080 Ink Jet Black. One Off			£8.90
CBM	1515	£2.70	£2.20	£2.00
	1525	£2.70	£2.20	£2.00
	MPS801	£3.60	£3.00	£2.80
	802/1526	£3.70	£2.90	£2.70
	803	£3.40	£2.90	£2.70
	MPS1000	£2.70	£2.30	£2.10
	4022	£2.70	£2.30	£2.10
	MSC801 Colour. One Off			£18.50
	DPS1101 SS	£2.40	£1.90	£1.75
	DPS1101 MS	£2.90	£2.50	£2.30
	DPS1101 Corr	£1.80	£1.50	£1.40
CENTRONICS	GLP 1/2	£3.40	£2.90	£2.70
CITIZEN	120D	£5.00	£4.60	£4.30
DAISYSTEP	2000 MS	£3.10	£2.60	£2.40
	2000 FAB	£4.90	£4.20	£4.00
EPSON	MX/FX/RX80 Black	£2.70	£2.30	£2.10
	MX/FX/RX80 Red or Blue	£3.90	£3.20	£3.00
	100 Series	£3.70	£3.30	£3.00
	LX80/LX86	£2.70	£2.30	£2.10
	JX80 Colour. One Off			£18.50
	LQ800	£3.70	£3.30	£3.10
	LQ1000	£4.50	£3.90	£3.60
JUKI	6000/2200 Corr	£3.10	£2.70	£2.50
	6100 MS	£2.90	£2.50	£2.30
	6100 SS	£2.40	£1.90	£1.75
	6100 Corr	£1.80	£1.50	£1.40
KAGA	KP810 Black	£3.10	£2.60	£2.40
	KP810 Red or Blue	£4.50	£4.10	£3.80
M/TALLY	MT80	£3.70	£2.90	£2.70
OKI	80/82	£1.40	£1.10	£1.00
	84	£3.90	£3.40	£3.20
	Mate 20 Colour	£7.00	£6.50	£6.20
	Mate 20 Black	£6.60	£6.20	£6.00
PANASONIC	Dot Matrix	£5.00	£4.60	£4.30
QUENDATA	DWP1120 MS	£3.10	£2.60	£2.40
	DWP1120 FAB	£4.90	£4.20	£4.00
QUME	Sprint 7/9 MS	£2.80	£2.30	£2.10
	Sprint 7/9 FAB	£4.00	£3.70	£3.40
SEIKOSHA	GP50	£6.00	£5.50	£5.20
	GP80	£2.70	£2.20	£2.00
	GP100/250	£2.60	£2.20	£2.00
	GP500/550	£3.90	£3.30	£3.10
	GP700 Colour. One Off			£18.50
	SP1000	£6.00	£5.50	£5.20
SHINWA	CP80	£3.70	£2.90	£2.70
SMITH CORONA	Fastext 80 (Twinpack)	£11.70	£11.20	£10.90
	TPI M/S	£12.50	£10.70	£9.95
	TPI Fabric	£5.70	£5.25	£4.95
	TPI Corr	£5.00	£4.70	£4.50
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	D300	£6.00	£5.50	£5.30
STAR	DP/GEMINI/SG	£1.40	£1.10	£1.00
	SR15	£4.90	£4.50	£4.30
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DD100	5¼"	100	£11.70
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MD12/30	3"/3.5"	24	£7.20
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SIZE	GSM	QUANTITY	1 BOX	2 BOXES
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EXACT A4	70	2000	£20.90	£18.75
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HP Laserjet Mk II	£84.95	Citizen Overture	£22.95

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5¼" JVC inc Plastic Case — BOXES OF 10 DISKS

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MD-2DD	D/side Q/dens 80TR	£15.99	£15.50	£15.25
MD-2HD	D/side H/dens 1.6MB	£26.99	£25.99	£25.49
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MD-2DD	D/side Q/dens 80TR	£15.99	£15.50	£15.25
MD-2HD	D/side H/dens 1.6MB	£26.99	£25.99	£25.49
VERBATIM – DATALIFE				
MD525	S/side D/dens 40TR	£11.60	£11.00	£10.60
MD550	D/side D/dens 40TR	£14.80	£14.00	£13.60
MD577	S/side Q/dens 80TR	£14.99	£14.75	£14.49
MD557	D/side Q/dens 80TR	£19.50	£19.00	£18.60
FUJI	*S/side D/dens 40TR	£10.99	£10.50	£10.25
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*Coloured Disks – red, green, blue, beige, grey £1.00 per box extra.

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3½"		**BOXES OF 10 DISKS**		
JVC	S/side D/dens	£17.99	£17.25	£16.99
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PRICES PER 10 DISKS

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3M 5¼" DS/DD	£11.90	£11.50	£11.25
DYSAN 5¼" HD/1.6MB	£20.95	£19.95	£17.95
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5¼"SS/DD 40TR	£6.40	£5.90	£4.80
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Life time guarantee. Disks include envelopes, labels, hub-rings and write protect.

3½"DS/DD	£18.80	£17.80	£16.80

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Epson EX800	£384.95
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UK'S LOWEST PRICES

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Epson FX1000	£379.95
Epson EX800	£384.95
Epson EX1000	£509.95
Epson LQ800	£399.95
Epson LQ1000	£525.95
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Ac. U. 11/87

Winchester Users

-Discard the Soft Option!

At last, a real solution to the problems of hard disc back up — the new Amcom Tapestreamers.

Amcom Tapestreamers provide a fast, reliable and economic means of backing-up the large amounts of data stored on Winchester hard disc systems. The speed and ease with which data is streamed onto magnetic tape makes backing-up faster, easier and more convenient with total Data Integrity. Multiple copies are easy to make, and data is quickly transferred back to the hard disc when required.

Amcom Tapestreamers provide:-

- Affordable Winchester Back-up
- Reliable Data Transfer.
- Fast Operation (80k/sec).
- Easy Multiple copies.



Amcom Tapestreamers are available to run not only on Amcom's definative E-Net Winchester based networks, but also on Amcom's new ADFS compatible Winchesters and standard Acorn hard disc systems.

Amcom for the complete mass-storage solution

Amcom

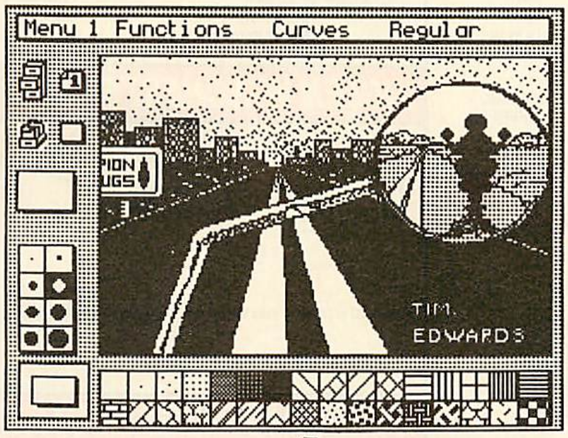
For more information on Tapestreamers, Educational Networking Systems and stand alone Winchesters, contact:

Amcom Software Ltd. 35, Carters Lane, Kiln Farm, Milton Keynes. MK11 3HL. Telephone (0908) 569212

the NIDD VALLEY

ILLUSTRATOR

A versatile graphics package designed to complement the high quality of the Nidd Valley Mouse. You can produce graphics and text like these using just ILLUSTRATOR and DIGIMOUSE.

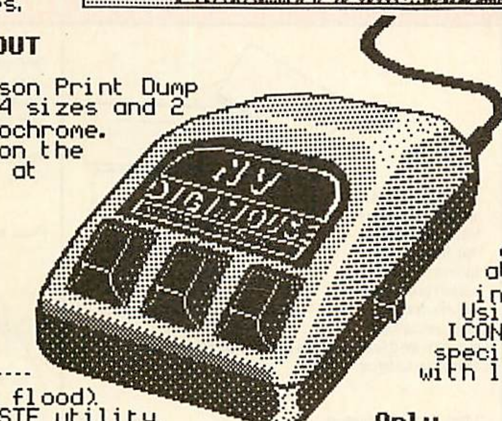


DESIGN YOUR OWN ICONS PATTERNS AND BRUSHES
The software not only has an extensive library of designs, but you can also create and edit your own to save and reload later.

SPECIAL EFFECTS
FLIP X or Y, ROTATE through 90,180 or 270°, and using the HOLD option, shapes can be repeatedly drawn whilst rotating, creating hundreds of design possibilities.

HIGH QUALITY PRINTOUT
The high resolution Epson Print Dump gives you a choice of 4 sizes and 2 densities in crisp monochrome. WYSIWYG ! What you see on the screen is what you get at the printer - no loss of detail and no distortion. This very powerful print option is designed to allow illustrations to be incorporated with Word Processor text.

AND THERE'S MORE !......
SPRAY and FILL (line & flood).
Easy to use CUT and PASTE utility, plus GRAB and CUT from saved screens redrawn at a size of your choosing.
A GRIDLOCK option allows you to place designs on an invisible grid.
And its DISC BASED !!! NO ROM's to fit.



PULL DOWN WINDOWS
Drawing functions and utilities are selected from 8 pull down and 4 popup windows. These are obtained from two main menu and two file ICONS.

DRAWING OPTIONS
Every possible drawing option has been provided including LINE, MULTILINE, RAY, CIRCLE, ELIPSE, SECTOR, CURVE, and POLYGONS. These can all be rubber banded or enlarged/reduced. Shapes may also be drawn inverse or filled, with or without outline. TEXT can be entered in a choice of 2 styles and 3 sizes, plus you can design your own FONTS with the powerful ICON designer utility.

ZOOM and PIXEL EDITOR
Using the superb full screen zoom and scroll feature allows you to make fine detail corrections and designs one pixel at a time. The current pixel area is shown in an actual size, off screen window. Using this feature in conjunction with the ICON and GRIDLOCK enables icons, fonts and special shape designs to be generated quickly with little or no graphics experience.

Only
£49.90
complete with mouse

ILLUSTRATOR is packaged with the NIDD VALLEY DIGIMOUSE for the BBC MICRO
A GREAT MATCH !

GRAPHIC SOFTWARE for CREATIVE DESIGNERS.

THE NIDD VALLEY MOUSE

This high quality, British mouse features a unique LINEAR LOCK which allows you to draw perfectly straight lines freehand, independently of the software.

The non-slip ball is held firmly in place and keeps in constant contact with your work surface. The mouse uses optical electronics, precision engineered to exacting standards.

Designed for comfort and long periods of effortless use, with an exceptionally smooth and accurate control.

ARTROOM/ACE SOFTWARE

Well-reviewed graphics design package from Clares, supplied on disc, with DIGIMOUSE, for the MASTER or COMPACT. Includes an extensive library of symbols, borders and pictures, zoom for detailed editing, reserve screen, selection of proportional fonts, and the full range of drawing options.

High resolution graphics and excellent print out quality. Supplied complete with 'ACE' Artroom Colour Extension.

ILLUSTRATOR & DIGIMOUSE
BBC 40 track DFS .... **£49.90** incl. VAT

ILLUSTRATOR software only
BBC 40 track DFS .... **£19.90** incl. VAT

ARTROOM/ACE & DIGIMOUSE
Master 128, 80 track ADFS .... **£64.90** incl. VAT
Compact 3½" disc .... **£68.90** incl. VAT

DIGIMOUSE only
BBC or Compact .... **£34.90** incl. VAT

WHEN ORDERING PLEASE STATE WHICH MODEL COMPUTER

HOW TO ORDER

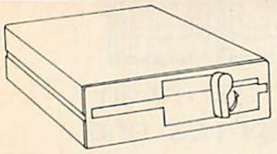
By cheque, ACCESS or VISA, or official Educational order, direct from Nidd Valley. PLEASE STATE FOR WHICH MODEL COMPUTER. All prices include VAT and P&P. 12 months guarantee, Allow 14 days for delivery.

Overseas — VAT element covers additional postage costs.

NIDD VALLEY MICRO PRODUCTS LTD
Dept AU1187
FREEPOST, Wetherby, West Yorkshire LS23 7YP, England.
Telephone: 0937 844661 Telex: 57453 MYSEC G

The Perfect Partners.

VIGLEN DISK DRIVES



Simply plug a Viglen disk drive into your BBC B (fitted with DFS), B+, or Master micro and immediately benefit from 400 or 800 KB of extra data storage capacity.

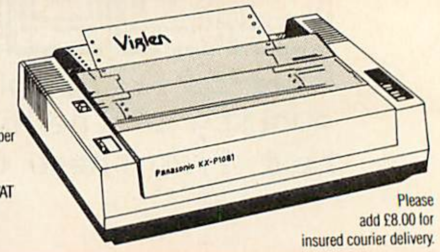
Stock Code	Description	Price inc. VAT	
VPD 0241	400K Single Drive, No PSU	£119.95	NOW WITH 3-YEAR WARRANTY
VPD 0246	400K Single Drive, + PSU	£134.95	
VPD 0243	800K Dual Drive, No PSU	£222.95	
VPD 0248	800K Dual Drive, + PSU	£249.95	
VPD 0249	800K Bridge Unit + PSU	£264.95	
VPD 0250	5.25" + 3.5" Combined + PSU	£249.95	
SPO 14	Single 400K 40/80T Drive	£ 99.95*	SPECIAL OFFER
SPO 19	Dual 800K 40/80T Drive	£189.95*	

* These two models are offered with 12 months warranty

Please add £8.00 for insured courier delivery.

PANASONIC PRINTER KIT

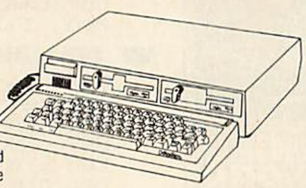
The Panasonic KX-P1081 comes complete with £45.00 worth of accessories FREE including tractor feed and roll feed units with paper, printer cable, and a specially designed metal printer stand.
Features include:
* 120 cps draft printing, 24 cps NLQ
* IBM and Epson compatibility through dip switch settings
* Prints 80 columns on A4 cut sheets, continuous stationery or roll paper
* 9×9 draft and 18×23 NLQ



Stock Code	Description	Price inc. VAT
SPO 79	Panasonic KX-P1081 plus accessories	£189.95

Please add £8.00 for insured courier delivery.

PROFESSIONAL CONSOLE UNIT

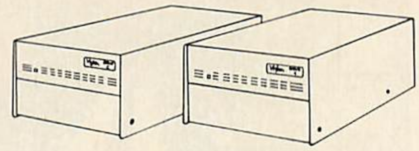


Give your BBC or Master micro a professional PC-look by replacing the existing lid with this smartly styled package which can house two disk drives. Complete with separate keyboard case and connecting cables. A full range of accessories is also available.

Stock Code	Description	Price inc. VAT
V0851	Viglen Professional Console Unit for the BBC micro	£49.95
V0861	Viglen Master Console Unit for the Master micro	£59.95

Please add £8.00 for insured courier delivery.

VIGLEN WINCHESTER DISKS

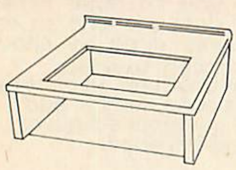


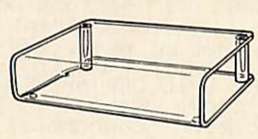
Plug-in 20 to 112MB of extra storage with the Viglen Winchester system.

Please add £8.00 for insured courier delivery.

Stock Code	Description	Price inc. VAT
Drive 0 Single		
V0150	VB20 20MB Viglen Winchester	£ 649.00
V0152	VB28 28MB Viglen Winchester	£ 699.00
V0155	VB40 40MB Viglen Winchester	£1045.00
V0156	VB56 56MB Viglen Winchester	£1119.00
Drive 1 Second Drive		
V0160	VB120 20MB Drive 1 Winchester	£ 549.00
V0162	VB128 28MB Drive 1 Winchester	£ 599.00
V0165	VB140 40MB Drive 1 Winchester	£ 819.00
V0167	VB156 56MB Drive 1 Winchester	£ 899.00
V0157	20MB Tape Streamer Backup	£ 724.95

PRINTER STANDS



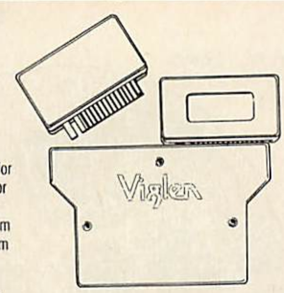


Viglen's printer stands are available in	Price inc. VAT
clear perspex, 80 col.	£19.95
136 col.	£29.95
high-impact ABS plastic colour-matched to most printers, 80 col.	£14.95
black metal finish	£ 9.95

Viglen's printer stands cater for 80 and 136 column printers and allow continuous stationery to be stored underneath.

Please add £3.00 postage and packaging.

ROM CARTRIDGE SYSTEM



Designed by Viglen for use with the BBC B or Master micros, the Rom Cartridge System allows a range of Rom software to be used and interchanged easily without fear of damage to the delicate pins. The system is simple to fit and requires no soldering.

Stock Code	Description	Price inc. VAT
V0560	Viglen Rom Cartridge System for BBC	£12.95
V0559	Viglen Rom Cartridge System for BBC (low profile)	£12.95
V0550	Viglen Rom Cartridge System for Master	£14.95
V0561	Single Viglen Cartridge	£ 3.99

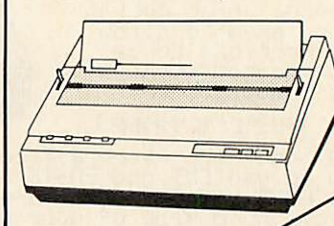
Please add £2.50 for postage and packing (£00.50 for single cartridge).

DAISYWHEEL PRINTER

The Panasonic KX-P3131 daisywheel printer is Diablo-compatible and utilises bi-directional logic seeking techniques to produce letter quality print at a rate of 17 characters per second (cps). Friction speed provides really efficient paper handling, whilst tractors are available as an option.

Stock Code	Description	Price inc. VAT
V0400	Panasonic KX-P3131 Daisywheel Printer	£299.95

Please add £8.00 for courier delivery.



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HOW TO ORDER

Simply fill in the coupon or write to us with your requirements enclosing a cheque/postal order or your credit card no. for the total amount. Don't forget to add the cost of delivery. Allow 7 to 10 days for delivery. Credit card holders may order by telephone on our sales hotline 01-843 9903 (8 lines). Orders from overseas should be exclusive of VAT (Please deduct 15% from the total cost).

Prices correct at time of going to press and offers are subject to availability. Dealer, Trade & Education Enquiries Welcome.

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Hanwell, London. W7 2QA
Telephone: 01-843 9903
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Fill in and post to Viglen Ltd., Unit 7, Trumpers Way, London W7 2QA. Tel. No. 01-843 9903. Please make cheques and postal orders payable to Viglen Ltd.

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Please find enclosed a cheque/postal order ☐ I prefer to pay by VISA ☐ ACCESS ☐ Tick one please. Carriage ______

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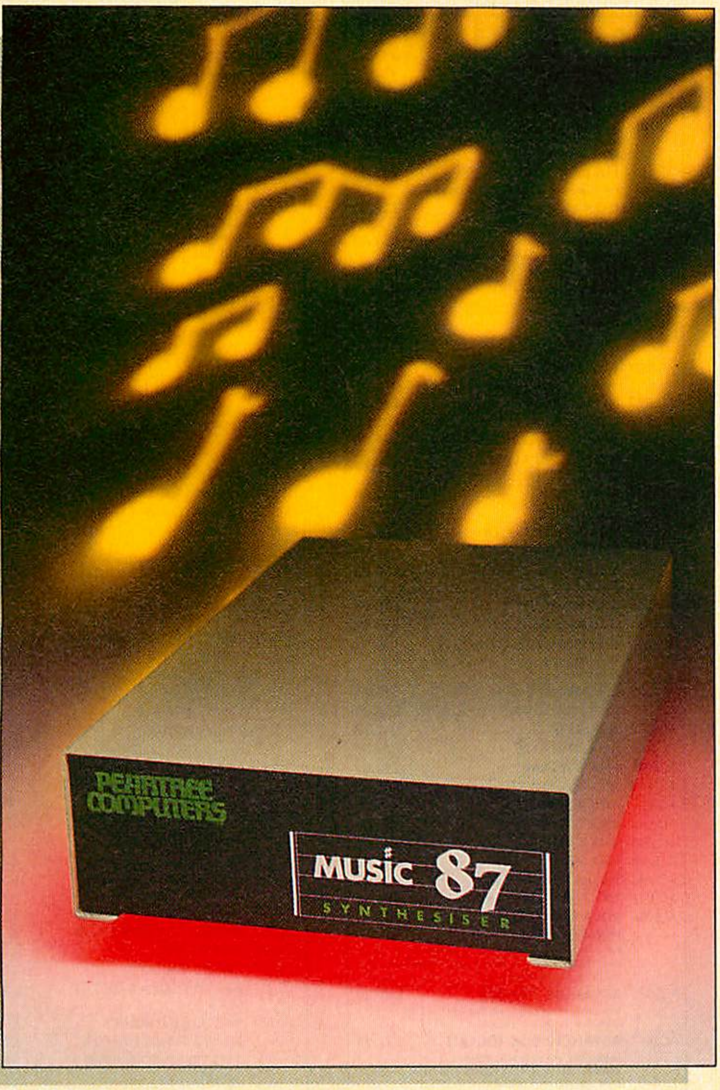
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Acorn
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▶ PEP024

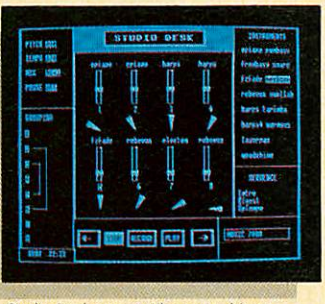
OVER 17000

visitors attended the 87 Acorn User Show. Most were amazed at the performance of the **MUSIC 87**. As a result we have been receiving hundreds of telephone calls from people wanting to know the differences and merits of the **MUSIC 87** synthesiser when compared to more expensive music synthesisers. Below is a table showing how the **MUSIC 87** compares to the Music 5000.*

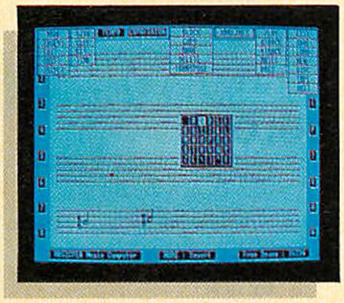
9 good reasons to buy the **MUSIC 87** rather than the Music 5000.*

FUNCTION	Music 5000	MUSIC 87
Mouse driven	✗	✓
2nd processor compatible	✗	✓
Light pen driven	✗	✓
Full 32k EPROM	✗	✓
Waveform designer as standard	✗	✓
Ability to bypass AMPLE	✗	✓
Graphic representation of waveforms, envelopes and score	✗	✓
Music printout as standard	✗	✓
Expensive	✓	✗

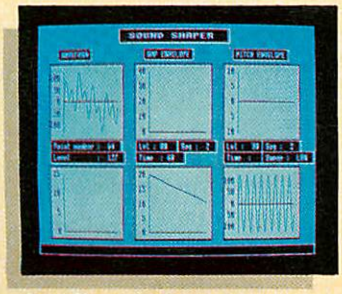
Price	Music 5000.*	**MUSIC 87**
	£161.00	**£79.95**



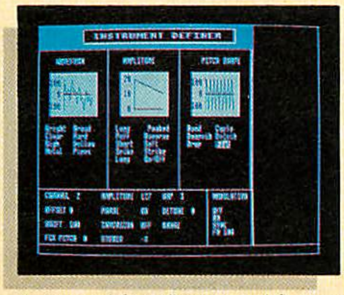
Studio Desk menu with mouse driven record, play, rewind options



Music Editor menu, light pen & mouse driven with complete menu options at top



Sound Shaper allowing you to create your own waveforms, envelopes, mouse, lightpen or keyboard driven



Instrument definer allows you to define your own instrument pitch, amplitude and wave forms

MUSIC 87
SYNTHESISER

MUSIC 87 software to upgrade your Music 500 or 5000 only **£39.95**

*Music 5000 is supplied by Hybrid Technology Limited

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BRITISH BROADCASTING CORPORATION MASTER SERIES MICROCOMPUTER

PEARTREE COMPUTERS LTD

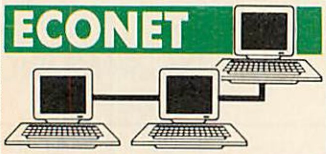
Approved service centre for all Acorn products.

Peartree House, No 1 Blackstone Road, Stukeley Meadows Industrial Estate, Huntingdon, Cambs PE18 6EF. Telephone (0480) 50595

HARDWARE

ACH001	**BBC MASTER 128** 128K complete with View, Viewsheet, basic editor. ADFS 1770 DFS *** *special offer includes FREE MUSIC 500*	£385.00
ACH002	**BBC MASTER COMPACT** 128K computer 640K disc drive built in RGB comp video, joystick and printer port	£375.00
ACH003	**BBC MASTER COMPACT TV** As above with PAL TV modulator	£395.00
ACH004	**BBC MASTER COMPACT MONO** As above with high resolution green monitor	£445.00
ACH005	**BBC MASTER COMPACT COLOUR** As above with RGB medium res colour monitor with video composite	£545.00
ACH011	**TURBO UPGRADE for MASTER 128** 65C102 co-processor 4MHz · 64K ram extra high Basic, high editor	£99.00
ACH012	**512K MSDOS for MASTER** IBM compatible DOS plus 8186 processor	£189.00
ACH041	**UNIVERSAL 2nd PROCESSOR** Allows both the turbo upgrade and the 512K upgrade to be run on the BBC Model B or B+	£75.00
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ACH020	**32016 CO-PROCESSOR** 32 bit processor · Complete with Fortran, Pascal, Cambridge Lisp, C Basic and 32016 assembler	£999.00
ACH021	**ACORN CAMBRIDGE WORK STATION** 4MB work station with 32016 co-processor	£3400.00
ACP003	**MEGAMOUSE** High quality UK manufactured · Slip free rubber coated ball · Fully AMX compatible	£49.00
ACH034	**ACORN MUSIC 500**	£49.00

ECONET



ACH006	**ECONET BBC MASTER ET 128** No DFS Econet station with 128K memory	£300.00
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ACH008	**ECONET STARTER KIT**	£79.00
ACH009	**ECONET SOCKET KIT**	£29.00
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AKHTER

All Peartree Disc Drives have a two year warranty by Akhter Computers

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ACH029	**DUAL 40/80 DRIVE, inc. PSU 800K MITSUBISHI**	£269.00
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PLEASE USE OUR CODES WHEN ORDERING

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ACP015	**PACE NIGHTINGALE COMBO** As above with Comstar software	£129.00
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ACP021	**WS4000 SCHOOLS MODEM** Autodial, autoanswer · Schools approved	£159.00
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ACP031	**BBC MICRO VIEWDATA**	£49.00

COMPONENTS

ACP007	**EPROM 27256 32K** 32K eprom	£4.95
ACP008	**EPROM 27128 16K** 16K eprom	£3.95
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ACP028	**BBC B+ AND BBC B IBM LOOKALIKE CASE**	£99.00
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ACP034	**BBC B DUST COVER**	£4.50

The Acorn Music 500

SYNTHESISER

Now available from **Peartree** the Acorn Music 500 for the BBC, BBC B+, Master 128

£49.00 excluding VAT

only from PEARTREE ▶ **ACH034**

SOFTWARE

Computer Concepts

ACS002	**WORDWISE PLUS** Mode 7 editing, preview in mode 0 · Multi document editing	£45.00
ACS003	**INTER SHEET** 40, 80 and 105 column mode multiple spreadsheet	£42.00
ACS004	**INTER CHART** Built in Epson screen dump · Supports pie, line & bar charts	£30.00
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ACS016	**VIEWPLOT** Enables you to draw lines, pie graphs Compatible with Viewsheet	£24.00
ACS017	**VIEWINDEX** Automatically creates indexes, notes, page numbers	£13.00
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SOFTWARE

ACS181	**OVERVIEW** Includes all View family software	£86.00
ACS181	**OVERVIEW** For the MASTER series only · Includes Viewplot, Viewstore, Viewspell, Viewindex and the View Printer Driver Generator	£86.00
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ACS039	**AMX DESK**	£19.00
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ACS042	**AMX PAGEMAKER**	£43.00
ACs043	**AMX 3D ZICON**	£21.00
ACS044	**AMX DATABASE**	£21.00
ACS045	**AMX XAM**	£21.00
ACS046	**AMX MAX**	£17.00
ACS047	**THE ARTIST SOFTWARE**	£39.00
ACS048	**ARTIST AND MEGAMOUSE**	£79.00
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MON006	**PHILIPS CM8833 COLOUR MONITOR** 14 inch medium resolution monitor · RGBI RGB TTL	£273.86
MON007	**PHILIPS CM8852 COLOUR MONITOR** 14 inch medium/high resolution · RGBI RGB	£299.00

MONOCHROME

MON009	**KAGA KX 117 GREEN MONITOR** P31	£89.00
MON010	**KAGA KX 118 GREEN MONITOR** Clarity exceptional on BBC text	£99.00
MON011	**KAGA KX 119 AMBER MONITOR** (PUL)	£99.00
MON012	**PHILIPS GREEN MONITOR**	£79.00

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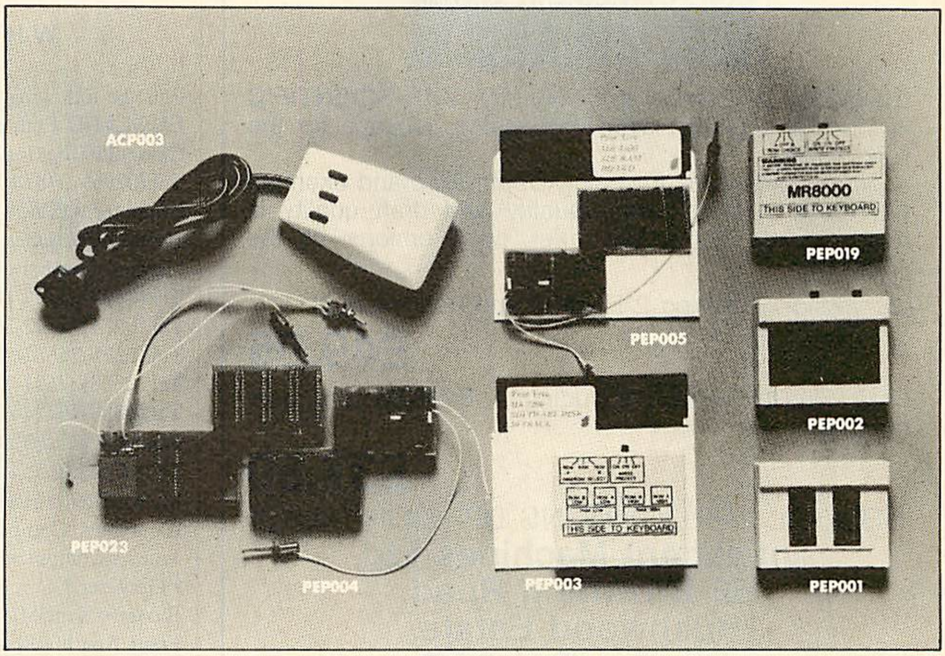
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- **BB BASIC V;**
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- **ECONET plug-in option;**
- **a variety of podules can be fitted.**

THE 300 SERIES

The 300 Series, identified by its red function keys,

The NEW High Performance 32 Bit Risc Processor from Acorn

consists of two models, ARCHIMEDES 305 with 0.5 Mbyte of RAM and ARCHIMEDES 310 with 1 Mbyte of RAM. These machines are the latest generation of British Broadcasting Corporation Micros. They offer, at low cost, all the basic features with expansion capabilities. Both machines have a 512 Kbyte ROM and a 1 Mbyte (unformatted) 3½" disc drive.

THE 400 SERIES

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- Includes Acorn's very latest 1987 Hi-BASIC

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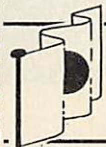
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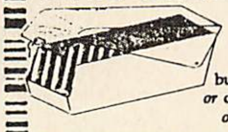
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LETTERS

Write to Letters, Acorn User, 20-26 Brunswick Place, London N1 6DJ

FINANCIAL DEVELOPMENTS

Sir, *Acorn User* readers and Micronet subscribers raised over £440 for the Centre World Development Education at the recent *Acorn User* Exhibition. I can't tell you how much we appreciate the contributions and your readers' generosity in taking part. I'd like to thank each and every one.

We have used part of the money to purchase a Beeb (secondhand) for the viewing area we are opening at over Resource Centre, so that visitors can look through our software while they are here. It is an idea I have had for a long time, and that is why I am so grateful to you for having enabled me to bring it to fruition.

E Segall
Centre for World Development Education

Many thanks to all our readers who contributed. A review of *Sand Harvest*, an educational program by the Centre for World Development Education, appeared last month in *Acorn User.*

ARC ADAPTATIONS

Sir, I am lucky enough to have a new Archimedes 305, for which there is little software available at the moment. I was itching to try out the new fast graphics, colours, number crunching and Basic commands. So what better than a graphics-oriented game such as David Lawrence's *Maze* published in September '86. When running in Basic 5 the difference is unbelievable. Various minor changes have to be made as well as others that will enhance the game. For even better results the program should be run in RAM Basic 5.

The vital adaptions are to delete lines 60, 3080 and 3130, and change line 330 to:

```
330 done=FALSE:M
%=&10000
```

You can enhance the game by using a different screen mode, may be mode 9 or 12, and altering the colour statements, and by using the OFF and ORIGIN commands.

VDU23; 8202; 0;0;0; could simply be replaced by OFF and VDU 29, 640; 800; could be changed to ORIGIN 640, 800.

M Treagus
Hampshire

MANDELBROTS IN MINUTES

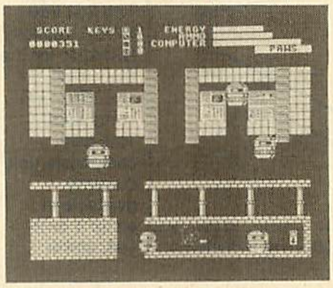
Sir, I tried many of the one-line graphics programs in the August issue. You might be interested to learn that on the Archimedes the Mandelbrot program ran in 5 minutes 53 seconds in mode 2; in mode 12 and mode 13, it ran in 6 minutes 27 seconds.

M Dunn
Lancashire

On a BBC micro, J Greening's Mandelbrot design takes well over an hour to plot. We are still recieving new one-line programs, and will print a follow-up shortly.

CONFIGURE CURES

Sir, I am sure that many other Master users have experienced the same problems as I have. Programs said to be Master-compatible hang up inexplicably. Bug Byte's *Plan-B* is one of several examples; after pressing space to start the game, the screen turns black.


Plan B: crashed inexplicably

After hours of frustration, I tried to run it on another Master. It turned out to work without problems. Then I copied all the *CONFIGURE options from the other Master to my own, and it then worked.

It turned out to be the Scroll-No Scroll configuration that caused the difficulties.

So try typing *CONFIGURE SCROLL followed by CTRL-Break before loading a program, and your problems may disappear.

H Sundt
Norway

COLOURED VIEW

Sir, I have a Master 128 which I use predominantly for writing worksheets in connection with my job as a teacher. I find *View* quite adequate for this purpose.

However, one application is defeating me. I have set up my disc with a !BOOT file to take me directly into *View* and set up the stored commands and ruler length ready for immediate use. However, I like to work with white text on a black-lined blue background. I can get this by typing CTRL-S followed by 0 4 0 0 0. I have not found a way of building this into the !BOOT file successfully. Can you tell me how to do this?

M Roe
Leicestershire

To put colour control codes into an exec file simply, you can include the following two lines:

```
*KEY0 |S|@|D|@|@|@

*FX 138,0,128
```

NEW PROBLEMS

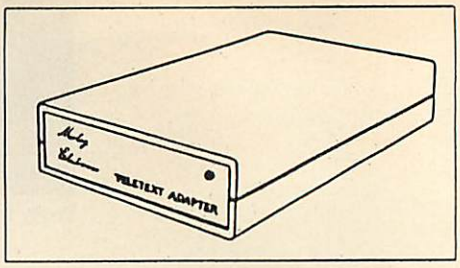
Sir, In reply to Dr Sonywell (Letters, September), there are two reasons that using the command ':NEW' is unsatisfactory in *Wordwise Plus*.

First, there are risks involved since you cannot see what you are deleting – there are no safety checks.

Second, typing ':NEW' deletes everything, text and segments, in *Wordwise Plus*. If, like me, you like to use the segments to work on a number of documents at the same time, the outcome could be catastrophic indeed.

J Ducat
Avon

TELETEXT ADAPTER

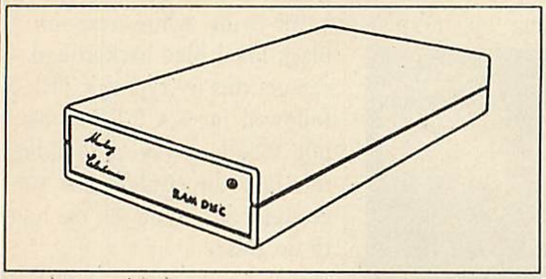


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* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
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* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer (no more TV or Radio Times to buy).

WHAT THE REVIEWERS SAID:
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". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*
". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*
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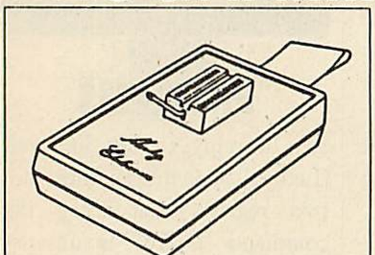
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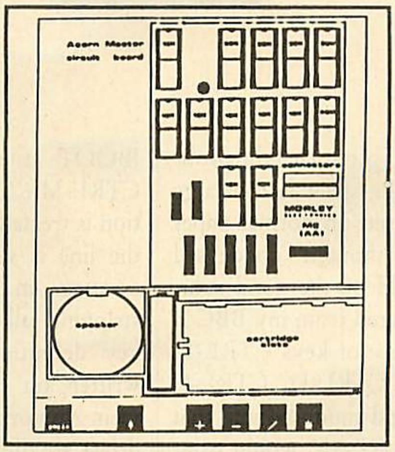
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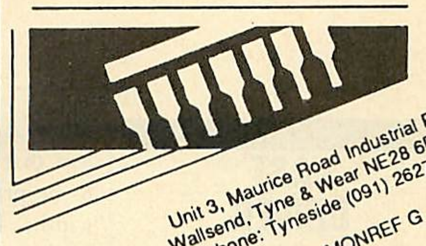
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FAST DRIVER

Sir, I read with interest the article on *View* printer drivers in the October issue of *Acorn User*. I own a Master 128 and a Panasonic KX-P1080 printer, and to date have accepted the normal printer output without the embellishments possible with a printer driver generator.

It was with delight therefore that I set about copying the appropriate listing to enable me to provide italics, bold print, underlining etc.

Having copied the listing and checked it twice for typing errors, I thought – here goes.

I encountered a problem which I hope you may be able to solve. On running the program and then trying to save it, I encountered 'Disc full at line 1540'. Is there some simple solution?

W Percival
South Glamorgan

Several people who typed in this listing have had problems of this sort. It arises if a space is omitted from line 1300. The line should read:

```
1300 PROCoscli("S
AVE "+name$+" 900
+FF 400")
```

As you can see, there is a space after '+FF'. Most listings on the yellow pages are printed using LISTO 1 and WIDTH 40. If you set your micro the same way before checking your typed-in programs, it can help to avoid problems such as these. Without the space, it reads '+FF4'.

CONDENSED ADVICE

Sir, I read with interest in Hints & Tips, August 1987, the suggestion made for printing out *ViewSheet* in condensed mode. As I often face the problem that the sheet is too large to be printed on normal paper width, I thought condensed mode could be the good solution. I entered from my BBC B the sequence of keys CTRL-B, CTRL-E, CTRL-D, CTRL-C in command mode hoping that my Taxan KP 810 would print the sheet in condensed mode, but this did not work. Does this only work on the Master and not on BBC B? Should the four keys be pressed on one line in the command mode or do I need to press Return?

D Clement
Belgium

The correct key sequence for condensed mode is CTRL-B, CTRL-A, CTRL-O, CTRL-C. Don't put a Return between the four keypresses. One problem is that some types of printer driver reset the printer back to normal print, but if no printer driver is used then you should have no problems with your Kaga 810.

KEY NOTES

Sir, I was very pleased to read Hints & Tips in the August issue. It answered several queries I have had regarding printing out from *ViewSheet*. Other codes I have found in my Taxan manual are CTRL-L for form feed eject, CTRL-R for cancel condensed mode and CTRL-N for enlarged print with self-cancellation.

Unfortunately I was unable to get the !BOOT to work properly. I am using a Master 128 and when attempting to !BOOT up *ViewSheet* using Martin Phillips' listing along with a couple of the codes listed above, the *KEY definitions are acted on immediately as if they were not key definitions at all. Also, when the !BOOT file is used, any CTRL-M (¦M) in a key definition is treated as a Return when the line is saved to disc, thus creating an empty line and stripping all CTRL-Ms from key definitions. !BOOT files written on my old model B seem to work OK and the disc drives are the same ones as used with the model B.

E Burke
New Zealand

If you want to include a Return in a !BOOT file, using the Master or Compact you can use ¦M. The ¦ character means that the next character is a control code. *BUILD decodes the ¦M into a Return character, CTRL-M.

But what if you want to include '¦M' in the !BOOT file? You have to specify '¦¦M' in *BUILD as, '¦¦' is decoded to '¦', and the next character is 'M'.

So in all the control codes for colour within *KEY definitions you have to replace '¦' with '¦¦'. Martin Phillips' !BOOT file becomes:

```
*SHEET
*TV 0,1
MODE 131
*KEY0 ¦¦S¦¦@¦¦4
¦¦@¦¦@¦¦@¦¦M*fx 12
5¦M
*KEY1 ¦¦B¦¦A¦¦O
¦¦C¦¦G
*FX 138,0,128
```

DIFFERENT CASES

Sir, I have often been infuriated while typing in programs which contain a mixture of upper and lower case letters. The BBC micro has the ability, like most typewriters, to print an upper case letter when Caps Lock mode is off simply by holding it down with Shift. But you can also do the reverse, print a lower case letter when Caps Lock is on. Hold down the Caps Lock key in conjunction with the Shift key. This makes the keyboard give capitals. Now when a lower case letter is required, press the key together with Shift.

Could you print a one-line memory downloader so that I can use long programs with DFS in the machine? Fitting the DFS 'took away' memory between &E00 and &1900.

C Webster
Kent

When a disc system is fitted, it grabs some memory for itself, and the DFS normally uses the RAM between &E00 and &1900. Here's a downloader to add to your long programs, so they can be used from disc. However, it can't be used with programs that have to load in data files.

```
   10 IF PAGE>&E00
 THEN PROCrelocate
   20 :
   30 REM Your pro
gram here
   40 :
10000 DEF PROCrelo
ate
10010 *TAPE
10020 *KEY0 F.X%=0
TO(TOP-PA.)S.4:X%!
&E00=X%!PA.:N.:PA.
=&E00¦MO.¦MRUN¦M
10030 *FX15
10040 *FX138,0,128
10050 END
```

QUICK QUICK SLOW

Sir, I am surprised that in Joe's Jottings, October issue, you claim the Shell-Metzner sort to be a fast sort. I tried it, and was shocked to find that it took 137 seconds on average to sort 500 randomly selected integers The quicksort typically takes only 47 seconds under similar circumstances.

The quicksort is the quickest method I know of.

J Robinson
Edinburgh

The Shell-Metzner sort is indeed fast in most circum-

stances, though Joe's needs were better covered by the simpler exchange sort. You'll find an article on the quicksort method on page 95.

MASTER PROSPECTS?

Sir, I am a Master 128 owner living in New Zealand and what I would like to know is do Acorn Computers intend to discontinue the Master series now that the new RISC machine is available, or will they continue to support the Master for a few years yet?

R Johnstone
New Zealand

An Acorn spokesperson replies that Acorn will continue to market and support the Master series as long as it is viable. Given the price different between the Arc and the Master series, the market for the Master will not collapse overnight.

RECLAIMING WORK SPACE

Sir, I own an issue 3 BBC B with an increasing number of essential ROMs in permanent sockets for the work I do. However, three of these claim their own work space and raise PAGE from &1900 to &1E00. The PMS *NTQ* ROM takes a page of memory, as does *SpellMaster*, and *Word Ex* takes two pages of memory.

I have the 6502 second processor but none of these ROMs will work across the Tube so my investment in it is negated. Is there any way I can claim back this memory?

I Crawford
Oxfordshire

No, the memory taken by these ROM's can't be claimed back. Each ROM needs some memory of its own to use as work space, and so PAGE is raised by the amount they take. PAGE can be lowered:

```
PAGE=&1900
```

but some of the ROMs probably won't work.

PROFESSIONAL PROGRAMMING

Sir, First of all, congratulations: Peter Eggleton's article 'Better by Design' on structured programming (October 1987) is the first time I have ever seen an article in an amateur's magazine on the sort of methodology which is now commonplace in commercial environments.

However, although this article was a large step in the right direction, to my mind it gave only half of the story.

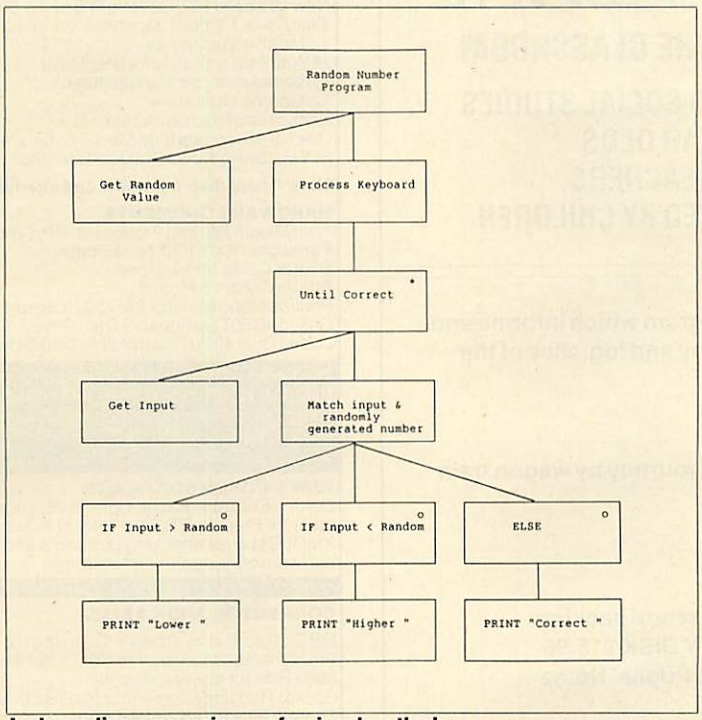
Mr Eggleton was misleading in stating that GOTO cannot be used with Jackson's method. Jackson stated early in his book, *Principles of Program Designs* that you may be forced to use GOTO to overcome deficiences in the programming language you are using. In providing WHILE... ENDWHILE in BBC Basic 5 Acorn is making an improvement to the language. If the language hasn't got the construct you require, you often need to use GOTO. Jackson's view: 'No matter – so be it.'

I thought Mr Eggleton's comment about pseudo-code was misleading since the implication was that pseudo-code is an alternative methodology to Jackson's diagrams – far from it. Many people I know of use both: first a program structure is devised, then pseudo-code is written from this, finally the program is coded from the pseudo-code.

Now for the omissions from Mr Eggleton's article. Where do program structures actually come from? Having read Mr Eggleton's article you might be excused for thinking you devise them yourself. Not so, according to Jackson. In Jackson programming, program structures do not simply come out of the programmer's mind; they are determined by the data the program manipulates. The standard textbooks all deal with the techniques for doing this and although it's clearly beyond the scope of a short introductory article such as Mr Eggleton's, I do think it should have been mentioned. The central point this method is that a program structure is derived from its data structures.

In conclusion, although I have my criticisms of Peter Eggleton's article, I think its emergence is a very healthy sign. Perhaps he could be encouraged to develop the theme – Jackson's method deserves far more than one short article and I'm sure there are many readers who would be interested to read further.

S Muir
Berkshire



Jackson diagrams: using professional methods

NEW DIMENSION

Sir, I am writing a program for my BBC model B computer which uses the Basic word DIM. If I go back to the line number which holds the word DIM then I get a 'Bad DIM' error. The User Guide says that this error is produced when an array is made up of negative numbers, for example: DIM A(−3). However, I have not done this. Could you explain why this does not work?

O Astley
Durham

One of the important points about DIM is that you can't *re*dimension an array. So the first time you go through the line, it works; the error occurs when you branch back to that line again.

The cure is to either branch back to the line after DIM, or possibly use the CLEAR command. This gets rid of all the variables used by a program except A% to Z%, so you can redimension the array.

TORN BETWEEN TWO MICROS

Sir, Reviews of the new Acorn Archimedes computer suggest that its market, apart from the educational field, is likely to be previous BBC micro owners who have sold their much loved BBC B and are considering upgrading to the Atari ST range. This is where the problem for Acorn begins: to get on the first rung of the Atari ladder will cost around £400, whereas to gain a foothold with the Archimedes is going to cost somewhere in the region of £1000 or more.

I realise the power and potential of Acorn's RISC chip, and the kind of money it took to develop, but I think it will be difficult for Acorn to sell it in a market where potential customers were considering paying only around £500 for their upgraded system. The Archimedes is clearly a brilliant machine, and I want one, but if Acorn target their prices wrongly, upgraders will commit themselves to the ST range and thus swamp the 'post eight bit' market. Acorn will find themselves with a superb machine, but a small user base.

I've just sold my BBC B, and am hovering with one eye on a 520/1040 ST and the other on my cheque book. The lure of the Archimedes for us 'veteran' BBCers is that the Archimedes technology will use BBC Basic, it's made in Britain, and it should be expandable, it promises to be as robust and reliable as most of us found our old Beeb's to be. History has shown Acorn not to be the kind of 'love 'em and leave 'em' company that other fast buck merchants have been.

If Acorn find it possible to give discounts to educational establishments, then they would be wise to aim 'entry level' A305 machines at a price we mortal punters can afford.

If Acorn could establish a VAT inclusive price for the A305 that breathes down the neck of Atari's 1040 ST, the growth of the Archimedes user base would far outweigh the narrowing of its profit margin.

D Butler
Lancashire

ARC FILING

Sir, I have just attended a most impressive demonstration of the power of the new Acorn RISC machine, and like other home users would be very interested in upgrading from my model B. But the Acorn demonstrator, having heavily plugged the compatibility angle, was evasive about how you could transfer programs, and data files from 5.25-inch floppies to the new machine.

I gathered that there may well be a number of roundabout ways to do this, involving networks, two machines back to back, *Kermit* chips and so on, but to the non-technical user these makeshift arrangements will require specialist help and seem likely to cause extra cost and delay.

Why is it that Acorn have not provided a straightforward means of just plugging in a 5.25-inch floppy drive to an Archimedes and reading the contents into RAM so that they can then be saved direct to the new 3.5-inch discs using the built-in drive?

It seems to me that a lot of people will be put off upgrading for want of compatibility with Acorn's original DFS!

R Smith
Fife

Acorn appear to have adopted a policy of using DFS on 5.25-inch discs and, ADFS on 3.25-inch discs. There are companies working on connecting 5.25-inch drives to the Archimedes, but products are unlikely to appear for a few months yet.

Acorn Forum this month describes how to transfer Basic programs from the BBC micro to the Archimedes, using the serial port. In this way all the time-consuming disc swapping can be avoided. Transfer of other files will be the subject of a future article.

COMPACT DISCS

Sir, I have a BBC Master Compact and have found that games on 3.5-inch discs are more expensive than the same games on 5.25-inch disc. I would like to use a 5.25-inch disc as well as my 3.5-inch disc. If I buy a suitable drive, will I be able to load BBC B, B+ or Master games in 5.25-inch disc format?

S Peters
West Glamorgan

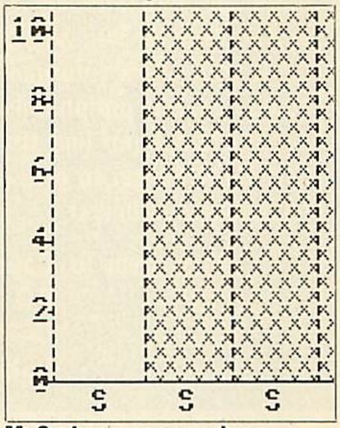
If you add an 5.25-inch disc drive to your Compact, then in principle you should be able to use a number of Master or BBC B games on disc. But you'll also need a 1770 DFS fitted, as Master and BBC B games don't use ADFS, the Compact's usual filing system. The 1770 DFS is on the latest editions of the Compact Welcome disc, and included as part of the Master Compact Companion. The Companion costs £39.95 and is available from Mertec Computer Products, 35-36 Singleton Street, Swansea SA1 3QN.

Copies of the Welcome disc containing the 1770 DFS as a ROM image are available for a nominal charge from Acorn themselves. The image can be easily loaded into sideways RAM.

EXTRA SPACE

Sir, I am having difficulty using a printer dump with my Star SG-10 printer. The problem is that prints of a graph are broken up by a series of regular gaps, as you can see from the example below.

I suspect that an extra line feed is being issued at each



Mr Cox' gappy screen dump

carriage return and this seems to be confirmed by the fact that spreadsheet prints are produced with double spacing.

I am sure that in view of the popularity of Star printers some of your readers must have met the problem too. I would appreciate any help they can offer in overcoming it.

A Cox
Lincolnshire

It looks like not double, but one-and-a-half line spacing. Graphics dumps need to adjust the line spacing so that the top dots of one line are adjacent to the bottom dots of the previous line. The control code for this is ESC "3"n, where n is the line spacing in 216ths of an inch. The Star is the same as the Epson printer in this respect, but it looks as though your dump isn't doing this correctly. Martin Phillips covered screen dumps in Hints & Tips in September 1986 and May 1987.

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HINTS & TIPS

Martin Phillips explains some FX commands to new users, looks at differing daisy-wheels and even saves paper in *View*

DAISY-WHEEL CHARACTERS

Daisy-wheel printers are much simpler to use than dot-matrix devices. There are fewer commands and no graphics to worry about. There is, however, one factor which can cause problems: the daisy-wheel itself. There are lots of different wheels available for most types of printer. Some wheels are simply different sizes or styles of print, but sometimes they have different characters as well. One daisy-wheel I came across recently substituted a comma for a full stop!

Imagine the problems when this wheel was used to print out a letter, or worse still, a program. There is a range of characters available by using ASCII codes higher than 127. ASCII stands for American Standard Code for Information Interchange, and normally printers use codes in the range 32 to 126 to represent all the normal characters. Most printers can accept all the codes in the range 0 to 255. Codes 0 to 31 are used to control features like line feed and form feed codes. The extra codes above 127 often represent extra characters that can't be obtained from the keyboard.

It is well worth finding out which codes give which character. A simple program which will do this is given in listing 1 on the yellow pages.

This will work with all printers, not just daisy-wheels. It will print out the character for each given ASCII code. The program skips over codes 0 to 31 and 127 to 157, as these are the control codes, and will do odd things to the printer (and the computer!). Codes 32 and 160 won't show up on the paper – they should always print a space. The program will then print out all the possible characters and their ASCII codes for a given daisy-wheel in a tabular form. The table will tend not to format properly when printing out codes greater than 126 because some of these ASCII codes are not recognised by the printer, and are simply ignored.

Some printers hide their extra characters – they may need a control code to print them, or even an 'escape sequence'. This is made up of two or more characters, the first of which is ASCII code 27. There is no easy way to find these characters, except by reading the printer manuals.

There will usually be a '£' sign on the wheel. The pound sign on the keyboard has the ASCII value 96. Often on the printer this is shown as some other character. This can be allowed for in most wordprocessors. With *View*, it is altered by using the printer driver (see October *Acorn User*, Hints & Tips). With *Wordwise* and its related wordprocessors you use the define pound DP embedded command to say which code produces £.

Often beyond code 126 there are some other unusual characters. Some of these oddities can be quite useful. The codes greater than 126 can't be accessed easily from the keyboard. They are quite easy to access from *Wordwise*, but not from *View*. Using *Wordwise*, simply type:

```
<f1>OC172<f2>
```

to print code 172. *Wordwise* will ignore the character for formatting purposes, so a justified line with this code in it will be one character longer. To overcome this we need another trick. On the same line as the code type:

```
|<f1>OC8<f2>
```

This inserts a space using the pad character, but the printer then does a backspace (OC8), which then compensates for the previous character.

WORDWISE REVISITED

In May 87's Hints & Tips I showed a way of setting up a !BOOT file to start up *Wordwise* and then load in a series of segment programs.

Essentially the routines consist of a complex !BOOT file together with a series of *Wordwise Plus* segment utilities. Obviously these utilities can be extended and adapted as required. The !BOOT file is shown in figure 1, just as it appears in *Wordwise Plus*. Do be careful not to put a Return after *KEY, and not to insert any extra spaces or Returns – there are only two, at the end of the last two lines. Save it as normal using option 1 of the *Wordwise Plus* menu. It must be saved as !BOOT. When this !BOOT file is run, function key

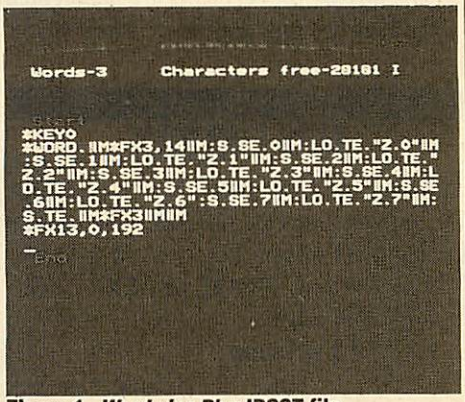


Figure 1. *Wordwise Plus* !BOOT file

0 is defined and then called up. This then loads a series of segment programs from disc. The disc should contain all the files expected by the function key. In my case I have labelled them 0 to 7 and saved them in directory Z, thus they are saved as Z.0, Z.1, and so on. When the disc is catalogued, these files are tucked out of the way at the bottom of the list.

One segment I use a lot, but which was omitted from Hints & Tips in May is shown in listing 2 on the yellow pages. It is saved as segment 4.

Segment 4 sets up a standard heading for letters or reports. This is easy to alter for any particular purpose. Indeed you could include a selection option to call up any one of several standard headings, each in its own procedure, as an alternative to Philip Trinham's menu system on page 90.

You can use this segment in conjunction with segments 0 to 3 from May, or on its own. The !BOOT file requires files for eight segments: for any you aren't using, save a 'dummy file' consisting of only:

```
REM Segment 6
```

Using these segment programs is simplicity itself. Call up the segment by pressing Shift and the appropriate function key.

To install the whole thing on a disc, make sure that the !BOOT file has been saved, and so have the files for segments 0 to 7. These should have been saved as Z.0 to Z.7. Finally type:

```
*OPT 4,3
```

to enable the disc to auto-boot. Pressing Shift-Break will then enter *Wordwise Plus* and load the segments.

If there are problems and nothing appears to have loaded, then carefully

check the !BOOT file – to do this, it can be loaded back into *Wordwise Plus*. A check through each segment will reveal which have loaded. Any mistakes made when entering the segments are highlighted when they are run, and so are easily cured.

£5

TIPS FOR EDIT

D Aylott from Buckhurst Hill earns £5 for the following tips for the *Edit* screen editor on the BBC Master 128.

When writing !BOOT or *EXEC files, the first line can be:

```
*|>filename
```

This then becomes the default filename. When saving, just press f3 then Return and the same after '>' at the top of the file gets used. This also serves as a reminder.

When writing Basic programs from within the editor do not use line numbers, but instead the first four lines you type should read:

```
*|>filename
*BASIC (or *HIBASIC)
NEW
AUTO
```

Using the editor makes such things as text and variable names easier to change. It is also easier to add procedures from libraries, as there are no line numbers needed. They can just be inserted using Shift-f2. Note that GOTOs cannot be used unless the line numbers are added once the program is complete.

Once a program has been completed and saved, it can be converted into a Basic program by typing:

```
*EXEC filename
```

or more simply:

```
*filename
```

If you use the AUTO technique, you'll have to press Escape once the program has been read in.

To strip REMs from existing programs and to delete line numbers from them, you can use the global replace function, f5. Some examples are shown:

```
* ^#REM^~$$/   remove REM lines
* ^#:$/        remove : lines
:REM^~$$/      remove REMs from
                 end of lines
^ $/$          remove trailing
                 spaces on line
$* ^#/$        remove all line
                 numbers
$^ $/$:$       puts : on blank
                 lines
```

The '^' symbol will find matches of single and multiple occurrences of the specified character. Thus '^A' will find matches of a or A or AAA or AaaA etc. The '$'symbol will find a Return character, so '^~$$' matches as many characters as possible up to the end of the line.

Within Edit, the SET MODE function key can also be used to show or hide the display at the top of the edit screen. Pressing function key 2, Shift-f5 then D shows the full help display, K shows the keystrip and 0,1,3,4,6 or 7 show no help display at all. The editor will always start up in the mode it was last left in, as the mode last used is stored in the Masters' CMOS RAM.

Using function key 1 (COMMAND LINE) you can then change the editing screen colours. This is done using the CTRL-S command, which can also be used with *View*, *ViewSheet* and many other programs. Type CTRL-S, then 0 for background or 1 for the text colour. Follow this with a number, 0 to 7, which controls the colour, and then three zeros.

The colour numbers are:

0	Black
1	Red
2	Green
3	Yellow
4	Blue
5	Magenta
6	Cyan
7	White

£5

SCREEN DUMPS WITHOUT A SCREEN DUMP

Impossible I hear you cry! Dr R G Steans from Camberley wins himself a fiver for a very nice tip which makes use of the *SPOOL command. *SPOOL will save any VDU calls made while the file is open, and this can even include characters sent to the printer. So if a *SPOOL file is opened just before a screen is dumped to the printer, then all of the dump is stored on disc as well as being printed. This is useful if you regularly want to dump a particular screen or part of a screen – partial screen dumps were included in June 1987's Hints & Tips. It would be ideal if you wanted to include the family crest or some logo on a letter heading.

The process is very simple. Assuming you have already got a file containing a mode 1 picture called, say, PIC, and that your screen dump program (on disc or on ROM) responds to a command like *SDUMP, you can create a file called ONESHOT, with a small Basic program like this:

```
MODE 1
*LOAD PIC
*SPOOL ONESHOT
*SDUMP
*SPOOL
```

Clearly any disc-based screen dump program must be on the same disc as the picture file. Then run the program. The picture should load, then a screen dump of it will be produced. While this is happening the disc drive will switch on and whirr away.

Once the program is finished, the same screen dump can be recalled from disc using *TYPE ONESHOT or *PRINT ONESHOT. The second screen dump will work much quicker, in fact as fast as the printer can operate, and it will work even without the screen dump program itself. *TYPE and *PRINT were discussed in last month's Hints & Tips. Briefly, use *TYPE on BBC model B, or *PRINT on a Master 128 or Compact.

For those who wish to try it out and have the June *Acorn User*'s listings disc, or if you have entered listing 1 from June 1987's Hints & Tips, then add the following lines to the program:

```
225 *SPOOL ONESHOT
235 *SPOOL
```

Do ensure then that when this program is run there is a disc in the disc drive, and that there is plenty of space on the disc to save quite a long *SPOOL file.

Clearly this procedure is only useful when the same screen needs to be dumped regularly. The advantages are that there's no need to be in the same mode as the picture was drawn in when you do the drop, it gives a faster printout. No memory space used for the program to produce the picture and no memory space is needed for the screen dump. The *TYPE command to redump the picture can be used directly from the command page of *View*. It can be used with *Wordwise* too, but not from the menu page. Include the *TYPE command within the text itself using an embedded command.

Finally, a further thought on this subject. The *SPOOL idea could be a simple way of sending any piece of information to printer: it need not be a screen dump. This information could be text, printer commands, character definitions whatever. Although these could easily be included in a program, this method would certainly

save program space and could be used with any language. If you do have any original applications, then do tell us about them.

£5

USING TWO PRINTERS

D J Hyde wins himself £5 for this money-saving tip. Having recently acquired a daisy-wheel printer to complement his existing dot-matrix printer, he spent much time unplugging the lead from one printer and connecting it to the other. Having looked around for suitable printer sharers, he discovered that the cheapest cost about £27. The solution he discovered is very simple – buy another Centronics plug and clamp it half way along the old printer lead so that both printers could be connected via the same lead. So long as only one printer is switched on at any one time, the off-line printer does not interfere with the data being sent to the other one.

Clearly quite a long printer cable is needed for this. Did you know that printer leads up to two metres long work without problems, and sometimes an even larger lead works?

*FX SPECIAL EFFECTS

New users are often confused and put off by the large number of *FX commands available on the BBC micros and Electron. There are 256 of these, and you can't remember them all. There are only a few of them that you would use regularly.

One of the most commonly used is *FX6,10. This stops the printer printing everything in double line spacing. Alternatively, if your printer prints everything on the same line, then *FX6,0 is what you need to type in. If you haven't got a printer, then you might want to type in *FX5,0. This stops any program that assumes you do have a printer from causing any trouble.

Most useful in a crowded computer room, or late at night is *FX210,1. This prevents the computer from making any noise. Conversely, *FX210,0 switches the sound back on again. You can make the normal beep just a bit quieter by typing *FX212,216.

The keys on the keyboard have a feature called 'auto-repeat'. If you hold down a key for a few moments, then the micro acts as if you are tapping the key very quickly. The speed of this auto-repeat can be speeded up using *FX12,3. This is mostly used for wordprocessing, because it allows you to move the cursor around the screen much more quickly. The normal repeat speed can be restored with the *FX12,0 command, and auto-repeat can be switched off altogether using *FX11,0.

Another really quite common command is *FX200,1. This disables the Escape key altogether, and is very useful in your own programs to prevent them being halted. *FX200,2 means that all the memory of the micro will be wiped clean if you press Break – the OLD won't get back a program after *FX200,2. *FX200,3 does both; it disables Escape and wipes memory when Break is pressed. *FX200,0 switches off all these effects.

VIEW PAPER SAVER

Mention *View*, and one question arises more often than all the rest put together: how do I stop the printer churning out a full page of paper each time something is printed? The answer is simple when you know. *View* is normally configured to print out a full page – this can be turned off using the stored command PB followed by OFF. Use Shift-f8 (Edit command) then enter PB in the stored command margin. Press return then enter OFF at the start of that line.

Now when the PRINT command is used *View* will not print out a full sheet. This PB command can only be used with *View 3*. Early versions of the *View* ROM can't be prevented from printing right to the end of the page.

REJUVENATED MICROS

A few old BBC micros eventually become very unreliable when you switch them on. It may take several attempts to get them working correctly, switching off then on again. Once going, however, they seem to work fine.

If yours is one of these old micros, you may have followed last month's advice about rejuvenating your micro, swapping around the keyboard lead inside the case. If you did, and your micro is still as reluctant to work as before, then the problem is very likely to lie in the power supply. The components used in power supplies like those fitted to the BBC micro do wear out in time, and they can't really be repaired.

If you suspect that this is the problem with your micro, then have it checked by a service centre. A new power supply should cost about £60 to buy and fit.

£5

SUPER ART SUGGESTIONS

Jim Elsam writes in from Cheshire to say that the instructions to load *AMX Super Art* into the Master 128 requires you to press CTRL-Break. There are some instructions in the !BOOT file after that, but they aren't used because the CTRL-Break closes the file. You have to type *POINTER ON by hand.

A quicker and more friendly method can be used, and it's particularly useful with small children. It is illegal, that is against Acorn's programming rules, but it works well enough. The last three lines of the !BOOT file should be replaced with:

```
FOR N=3 TO 7:N?&2A1=&C2:N.
*POINTER ON
*| now press CTRL-Break
*| the type *ART
```

This makes life that bit simpler.

WINDOWS IN VIEWSHEET

In *ViewSheet*, you can set up several 'windows' – separate areas of the screen that scroll independently. The key that moves the cursor from one window to another is f2, but in some other spreadsheets the Tab key is used. You can make the Tab key have the same effect as the f2 key using:

```
*FX 219,130
```

So Tab can now be used to switch between windows.

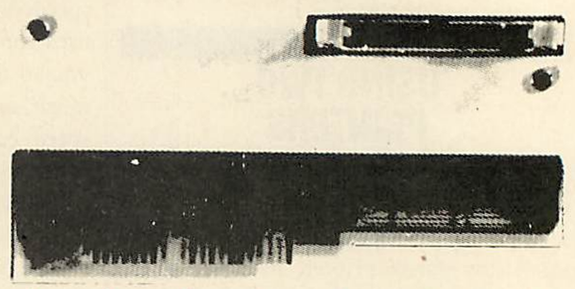
The Tab key can be made to emulate any other key on the keyboard in this way too, using *FX192, <number> where the number is the ASCII number of the key to be emulated.

Send any hints and tips of your own to Martin Phillips care of Acorn User, *Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.*

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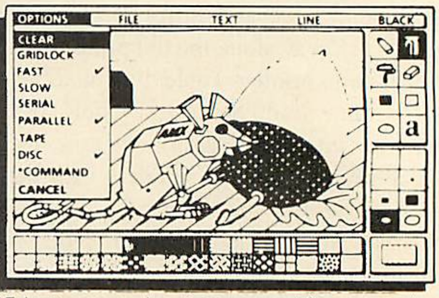
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FIRST BYTE

PASSING SENTENCES

We complete our look at the CALL statement by explaining how to pass variables to and from machine code

Tessie Revivis

We return this month to the last of our series of machine code tutorials, though we will be using machine code for graphics and file handling in the coming months.

In September we had a brief introduction to the very versatile CALL command. Let's now take a closer look at CALL's parameter blocks and types, and provide some more examples of its use.

Parameter blocks

When CALL is used to execute a machine code program, the Basic interpreter counts up the number of parameters after the command and stores this value in location &600 – if there are none then a zero is placed there. Basic then uses the rest of this 'page' of memory, from &601 onwards, as a parameter block to store a three-byte identity for each parameter. The identity consists of a two-byte address which points to where the actual parameter is stored in memory, and a byte saying what type of parameter it is. We will come back to these later on in this article.

As each parameter takes up three bytes in the parameter block, and there are 255 bytes of page 6 left (the 256th being used to hold the number of parameters). It follows that the maximum number of parameters allowed is 255/3 or 85. Any program that has 85 parameters passed to it is likely to be very complex indeed! Figure 1 summarises the parameter block layout.

Parameter types

As mentioned, there are various types of parameters. You should already be familiar with several: integer numbers (whole numbers such as 24 or 567), real numbers (ones with decimal points such as 1.234 or 567.9) and character strings. The CALL command can identify a total of five different types of parameters. These are as follows, with the type byte which is used in the block given in brackets:

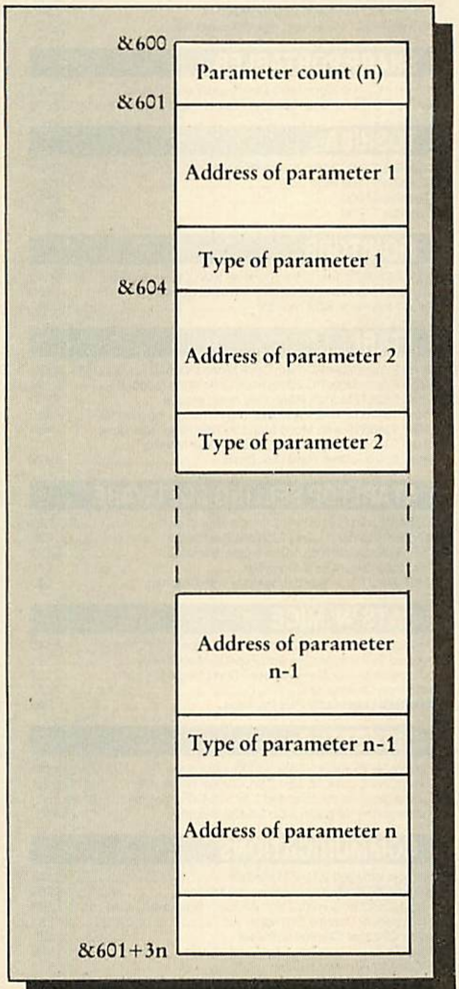


Figure 1. Format of a parameter block

Single byte integer (&00) This is a single-byte number between zero and 255 and must have been specified by using the ? operator – remember that the ? operator is used to read or write a one-byte number to or from memory. For example, ?&70=255 will write (or poke in computer jargon) 255 into memory location &70, while PRINT ?&70 will read (or peek) the value held in location &70. The address in the CALL block is the memory address pointed to by the ?. For example, CALL code, ?1234 will give the three-byte CALL block entry of &34, &12, &00. &34 and &12 are the address specified in standard 6502 reverse format, and &00 is the type byte to tell you it's only a single byte at address &1234.

Four-byte integer (&04) These are similar to the previous category but four times the length. This type of parameter can either be specified as !‹addr› or more commonly as an integer variable such as A%.

Five-byte real (&05) This is a 40-bit long floating point value specified by a real variable. The format of floating point numbers is rather too complex to cover here.

Fixed string (&80) These are the types of string that are accessed from Basic using the $ indirection operator, as in $&900="Hello World". The address given in the parameter block is the address of the first character of the string. The other characters are then stored in successive bytes until the end, which is marked by a carriage return character (ASCII &0D). Figure 2 shows how the string would be stored in memory. You must be very careful not to mix this type of string up with a true string variable which, as we will see next, is stored in a very different way.

String variable (&81) This is the type used when a fully fledged string variable is given as the parameter, for example, CALL search, name$. Rather than the parameter block pointing straight to the text of the string, it points instead to a four-byte block called the string information block (SIB), the first two bytes of which in turn point to the string's actual text. The fourth byte of the SIB contains the current length of the string, and the third byte shows the number of bytes allocated for the string's text, that is, the maximum length of the string. Because the length of the string is given in the SIB, no terminator is needed for the actual text, which is just stored as a sequence of ASCII characters.

This is given the lofty description of 'double indirection' and is shown diagram-

matically in figure 3. Listing 1 on the yellow pages prints out the number of parameters passed, and their types. Try experimenting with this program to familiarise yourself with the types.

Returning parameters

As well as using parameters to pass values to a machine code program, they can also be used to pass values back to the Basic program that issued the CALL statement. This is because the parameter block contains a pointer to the actual value of the variable stored in Basic's work space. Any changes made to the variable will directly affect the value read by the Basic program when it is returned to. This is illustrated in listing 2 which swaps two variables. If the variables are of the wrong type, a mismatch error is given and no swapping is done. Note that when two strings are swapped only the SIBs are moved, the text being left untouched. This is a much easier way of returning values from a machine code program. Unlike the single-byte values returned by USR, which has to have its components decoded the altered variables are instantly available.

An annoying side effect of this behaviour is that the parameters given in a CALL statement must be variables. A way round this is to assign any constants to variables, and then use the variables in the CALL. One example is:

CALL &900,23

is illegal, whereas:

temp=23:CALL &900,temp

is valid, as a variable is passed.

Altering string variables

Because of the special way in which string variables are stored, extra care is needed when altering them. If the length of the new string is the same or less than that of the original string, there is no problem. The text can be altered as required and the length byte of the SIB changed to reflect the new length. If, however, the string is increased in length, care is needed in case it exceeds the memory allocated to it.

If the string was to get longer than the memory set aside for it, it would be necessary to allocate a new block of memory. This is possible, but very messy and generally it should be avoided.

If you are going to alter the lengths of strings via the CALL statement, it is best to make sure each string used can be increased to maximum length by putting in a line like:

A$=STRINGS$(255," "):A$=""

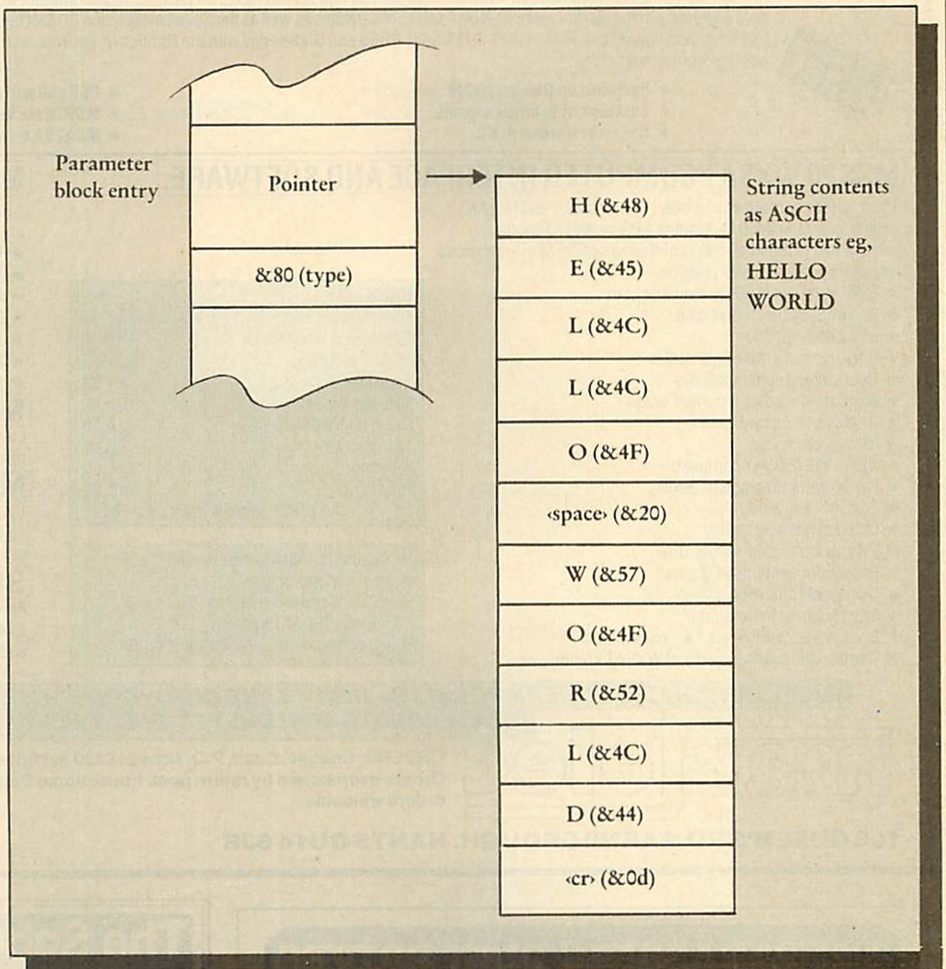


Figure 2. Format of fixed string in memory

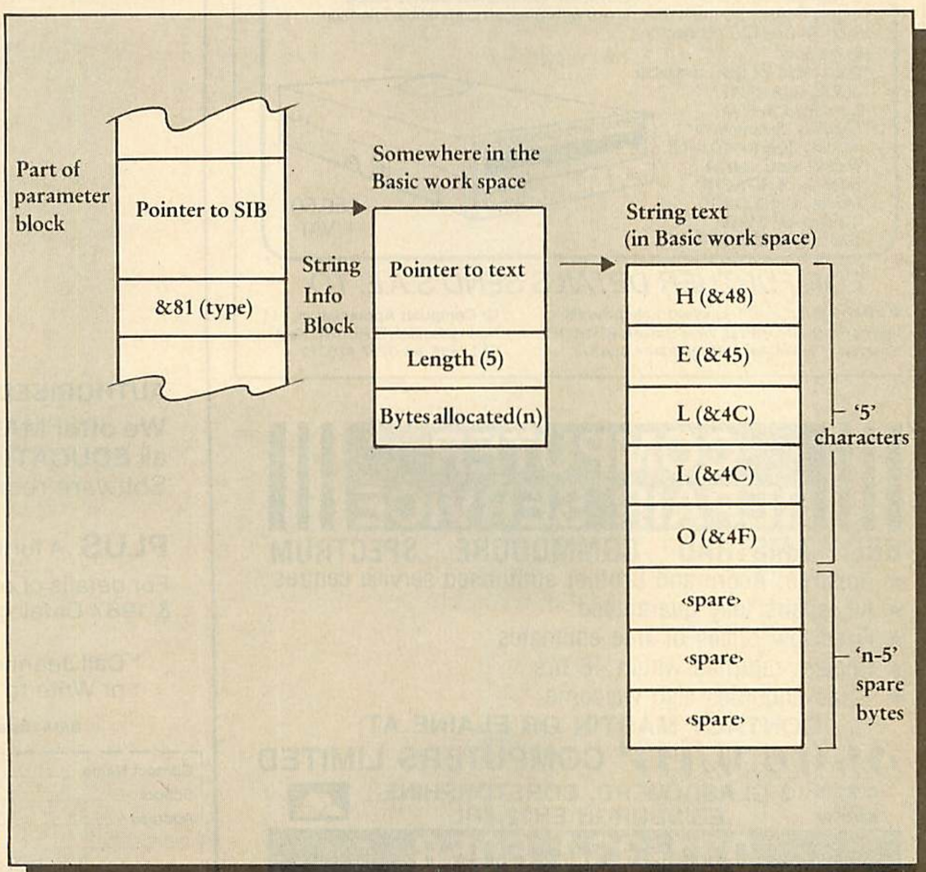


Figure 3. Format of string variable in memory

which will set A$ to the null string, but also allocate a 255-byte chunk of memory to it.

Up until now we have only concerned ourselves with simple variables such as A$, but we will end with a look at passing arrays using CALL.

If you just want to pass a single element using CALL, it is simple. You just list that element in the parameter list. For example:

```
num=5:CALL &900,num
```

and also:

```
DIM num2(5):num2(3)=5:
CALL&900,num2(3)
```

will both point to somewhere in the Basic work space that contains the floating point representation of the number five. The machine code routine called can't easily tell that the value is part of an array rather than just a simple variable.

Trying to pass a whole array to a routine using CALL can be difficult. Unfortunately there is no simple way to do it, but it is possible by a somewhat convoluted method as long as the number of dimensions in the array is known. For all arrays the first element stored is the one with all the subscripts zero, for example a%(0).

This first element is always preceded by a block of information giving details of the number of elements in each dimension. The format of an array is shown in figure 4. For a given number of dimensions the size of the element count block will be constant, eg, three for a single dimension and five for two dimensions. The block will always start at the address of the first element minus the block's length. Therefore, if we pass, via CALL, the first element of an array, it is possible to access the whole array. Don't worry if you can't understand this, it is quite complex and not often used. To make things clearer an example is given as listing 3 in the yellow pages, which prints, in hex, all the elements of an integer array.

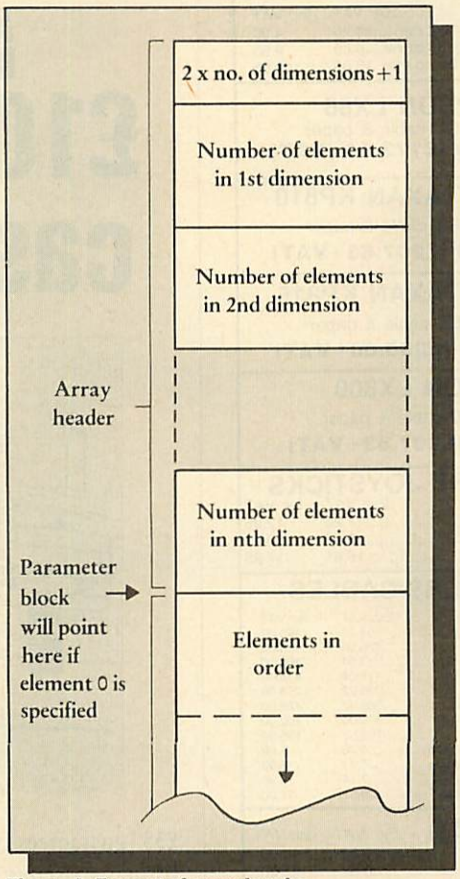


Figure 4. Format of array header

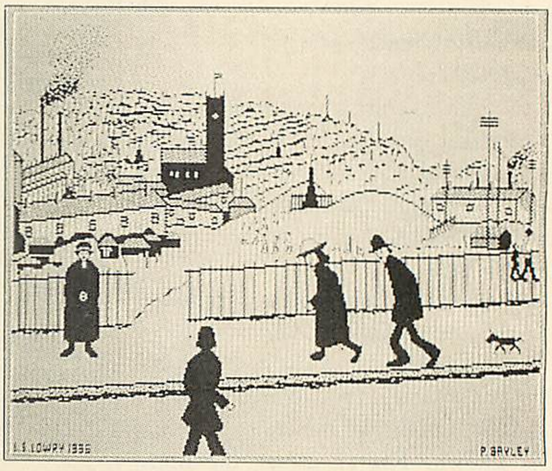
Your machine code should now be able to use integer and string variables from Basic, but real variables still present a problem. The way they are stored in memory is complicated, but there are ways around this. You can round the real number to an integer before the CALL. Or you can use the STR$ command to convert the variable to a string. After the CALL, use VAL to return it to a real number.

See the yellow pages index on page 113 for details of Tessie's listings.

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ACORN FORUM

David Atherton presents a selection of readers' shortcuts and solutions along with some of his own

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BBC TO ARC FILE TRANSFER

Michael Walls has taken the plunge and bought an Archimedes. He wants to transfer his BBC Basic programs across to run under the new Basic 5. Nowhere in the Welcome manuals does it tell you how to wire up the serial port plug, but Michael has worked it out. The Archimedes connector is shown in figure 1 together with the connector used to join it to the other BBC micros.

When a cable has been made up, nine-pin D-type to five-pin DIN, and plugged into the computers, the programs can be transferred. I first covered this for the Compact in the January 1987 issue.

At the Archimedes end, type:

```
*CONFIGURE BAUD 7
*CONFIGURE DATA 5
```

Then press CTRL-Break, and type:

```
*FX 2,1
```

Now at the BBC micro end, load your Basic program in, and type:

```
*FX 7,7
*FX 8,7
*FX 3,1
LIST
```

The program now lists, and is sent along the cable to the Archimedes too. To complete the process, type:

```
PRINT "*FX 2":*FX 3
```

and finish by pressing Escape on both machines. The Basic program should now be in Archimedes' memory. Michael has not yet managed to transfer machine code programs, as they need a proper system for file transfer. This will be covered in a forthcoming issue.

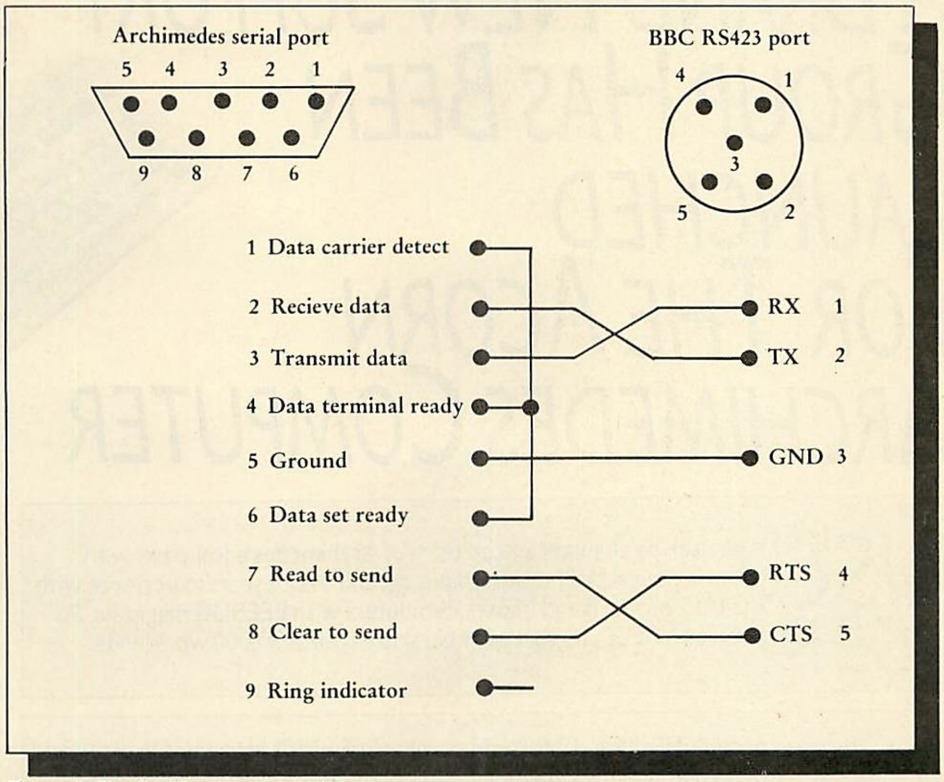


Figure 1. The Archimedes connector

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EDITING BASIC IN WORDWISE PLUS

When using a proper text editor to write Basic programs, line numbers just get in the way. Removing them makes programs easier to read, and forces you to use structures by making GOTO impossible. Most important of all, editors other than the Acorn Basic Editor don't support renumbering, and so by removing line numbers you can insert new lines of code at will, without tediously returning to Basic for renumbering.

Wordwise Plus makes an excellent editor for Basic programs. D Mortimer from Reading has submitted a segment program (listing 1 on the yellow pages) which will strip the line numbers from Basic. You must create an ASCII version of the program, and then load that into the *Wordwise* main text area. Then load the segment program into a spare segment. To make an ASCII version of a Basic program in a file called 'ASCVERS', simply type:

```
*SPOOL ASCVERS
LIST
*SPOOL
```

Once loaded into *Wordwise Plus*, the segment program will remove the line numbers. After editing the numberless program, put AUTO on a line of its own at the top of the file. Then save the file, enter Basic and *EXEC the file back in again. The AUTO command will put a line number in front of each line as it is read in.

£10

64 TEXT ROWS ON MASTER SCREEN

Martin Hesketh from Ryton, Tyne and Wear has sent me an interesting program (listing 2 on the yellow pages) to generate 64 rows of text on a Master screen. It sets up code to double the resolution of the screen. It will work in any mode except teletext by changing the variable 'mode' at the beginning of the program.

This works by switching between the screen in main memory, and the screen in shadow memory 50 times a second. When interlace is switched on this means that the two screens are displayed very slightly offset from each other, creating the effect of doubled resolution. A simple idea, but very novel and quite effective. Due to the switching of the screens the display does flicker a bit. However, on most monitors and some televisions the text displayed is still legible.

To generate text characters, Martin has split the rows of the characters, and assigned rows one, three, five and seven to one screen and rows zero, two, four and

six to the other. When placed 'on top' of each other the effect is of perfectly formed half-height characters.

When the program is run, black lines occasionally appear near the bottom of the characters. This is because the two screens being displayed do not synchronise with the program. You can usually solve the problem by re-running the program.

The program would theoretically generate graphics at 640×512 resolution when used in mode 0, but it is very difficult to get such results as the MOS cannot deal with the twin screens: poking the screen memory directly is the only way to produce such graphics.

£10

SIDEWAYS RAM DFS BACKUP

Sheerness reader A Valentine has a Master 128 and single disc drive, and had the bright idea of using the four sideways RAM banks to buffer data during backup. This drastically reduces the number of disc swaps required. His program (listing 3 on the yellow pages) allows an 80-track disc to be copied in four swaps, and a 40-track disc in just two! It works by loading in 24 tracks at a time and storing them in sideways RAM, and then recalling them so they can be put back onto a disc.

To do this the program requires all 64k of the sideways RAM in the Master series. However, it can be altered to use less, by setting 'maxtrackread' to six, 12 or 18, in which case only one, two or three banks (always starting at bank W) will be used. But this will mean more swaps of the disc, defeating the object of the program.

To run the program, type in the listing, run it, and it generates a machine code file called SRCOPY. This should be *RUN. The program will ask for source drive, destination drive, pause required between read/write and whether you want to copy an 80-track disc.

If you key 'Y' at the 'pause required' prompt, you will get a 'press a key' pause between reading and writing. Mr Valentine points out that by giving you the choice it happens anyway if source and destination discs are the same, you can copy between side 0 of one disc and side 2 of another, which you can't with the normal DFS backup commands. If you key 'N' to the '80-track' prompt, only 40 tracks of the disc will be copied.

£10

ELECTRON HARDWARE SCROLLING

The electron display chips are different to their BBC micro counterparts, but Carl Bateman of Kidsgrove has found that this is no handicap to the implementation of hardware scrolling.

The main problem with Electron hardware scrolling is that, without a 6845 chip, the normal VDU 23,0 system used on BBC micros cannot be used. However, the Electron OS still needs to keep track of the screen start address, and this is done by the ULA. Page &FE (known as SHEILA) holds a number of ULA registers, interrupt status and control, cassette data shift register and so on. Locations &FE02 and &FE03 are used to store the screen start address. All locations in SHEILA can be written to by direct polling, or better still by using *FX151,X,Y. X is the offset from &FE00; and Y is the value to be written.

Before being stored the screen start address is shifted to the right by one bit, and then stored in &FE02 and &FE03, low byte first. For example, the start of an unscrolled mode 4 screen is at &5800. Shifted right (or halved), that's &2C00, so &00 is stored at &FE02, and &2C at &FE03. By altering these registers it's possible to have limited hardware scrolling, and to show areas of memory on the screen other than &3000 to &7FFF.

Carl's listing (listing 4 on the yellow pages) shows how hardware scrolling can be set up. While vertical scrolling is fully available, the sideways scroll is a bit on the jerky side. This is because the Electron ULA will only take notice of a change of 64 bytes or more in the value of the screen start address.

As with the BBC micro, while screen start address is within the normal &3000 to &7FFF range, the circuitry ensures that information passing off the top of the screen reappears at the bottom, and vice versa. Similarly, as a character drops off the right of one line, it will reappear at the left at the start of the next line.

Entering *FX151,3,4 allows you to look at memory from &800 upwards. To start looking at memory from a particular page, the last parameter should be the memory address DIV &200. For more precise control, use *FX151,2,y to change the value of &FE02. The system doesn't seem to want to display RAM below &800 on screen, even when the above formula is followed. This all goes to show that you can do a lot of fancy tricks on an Electron.

£5

INSTANT KEYBOARD BEEP

Electron owner P A Bender has sent me a short, neat tip for adding a keyboard beep to your computer. This works on everything from an Electron to a Compact. Type in the following:

```
!&90=&EE4C07A9:?&94=&
FF:?&220=&90:?&221=0
```

The effect of the beep is not immediate, you have to turn it on with *FX14,2, and turn it off again with *FX13,2.

This will cause a beep with every keypress. Of course, the usual beep is far too long, so do an *FX214,1 to shorten it. *FX213 changes the pitch: *FX213,180 is quite pleasant.

UNDERUSED LOCATIONS

When writing small machine code utilities, you almost always need a few bytes of work space in zero-page. Page zero is special: some 6502 addressing modes and some operating system routines need it.

Many people use the area between &70 and &8F, because Basic sets this area aside for machine-code programs. But not all other languages do, and the whole point to machine code utilities is that they should be usable from any language.

So is there an area of zero page that all utilities can use? In fact, there is. The operating system reserves &AB to &AF for star commands.

That includes the sort of utilities you run from disc using a star command. One time when you would use this area is in calling Osargs. For example:

```
LDA #&01
LDX #&A8
LDY #&00
JSR &FFDA \osargs
```

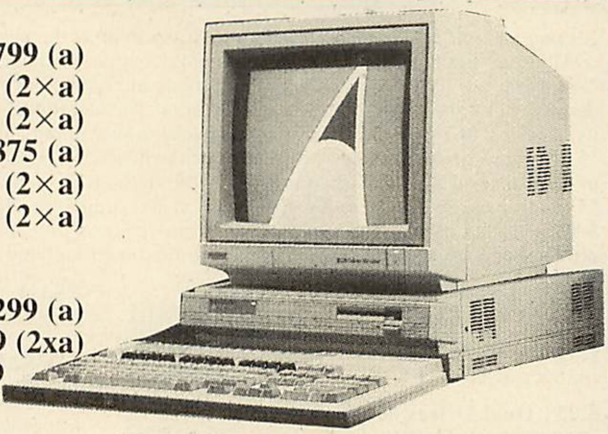
returns the address of the command line that called the utility, so that the rest of the text from the command line can be read. The address is put in the first four bytes of the zero page workspace at &AB-&AB.

Send your contributions for Acorn Forum to Acorn User, *Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.*

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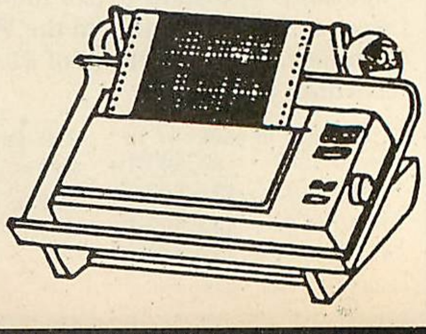
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NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

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TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)

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MIRRORSOFT FLEET STREET EDITOR	£35 (d)

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Send for details on our full range of CP/M & PC DOS packages for Business, Communications & High Level Languages.

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

*All software supplied by us is known to operate with the appropriate Acorn Disc filing systems. We **cannot** comment on their use with other DFS systems.*

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VIEWSTORE	£37 (d)
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ACORN VIEW PROFESSIONAL (BBC)	£85 (c)
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MINI OFFICE II DISC Version	
For B & B+ 40T or 80T	£14.75 (d)
For Master 80T	£17.30 (d)
For Compact	£19 (d)
MINI OFFICE II ROM Version For Master, Compact, B+ & B	£48 (c)

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TEAM DISASSEMBLER	£145 (b)
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ISO-PASCAL STAND ALONE GENERATOR	£30 (d)
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ICON MASTER	£29 (d)
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ADV TELETEXT UTILITIES ROM	£7.95 (d)

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FONTWISE+	£22 (d)
FONT EDITOR	£22 (d)
RAMROD	£37 (d)
BROM PLUS	£32 (d)
MACROM	£37 (d)
BETABASE	£27 (d)
WHITE KNIGHT MKII	£16 (d)
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A series of programs developed in many cases alongside Radio & TV programmes by BBC's Education Department which supplement the classroom studies by moving and colourful displays helping in clear understanding of a variety of subjects. Some packages also include audio cassettes.

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Book £8 (d)	Audio Cass	£5 (d)
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S.T.:WAVES	Disc	£14 (d)
S.T.:RELATIONSHIPS	Disc	£14 (d)
S.T.:BONDING	Disc	£14 (d)
S.T.:ELECTROMAGNETIC SPECTRUM	Disc	£14 (d)
S.T.:ELECTRONICS IN ACTION	Disc	£14 (d)
S.T.:NEWTON & THE SHUTTLE	Disc	£19 (d)
S.T.:ECOLOGY	Disc/EC	£19 (d)
S.T.:POLYMERS	Disc/EC	£19 (d)
S.T.:CLASSIFICATION & PERIODIC TABLE	Disc	£20 (d)
S.T.:FOOD & POPULATION	Disc	£20 (d)
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SEC.SCIENCE:THE MOLE CONCEPT	Disc/Aud/EC	£16 (c)

GENERAL

VU-TYPE PROFESSIONAL	Disc	£19 (d)
WHITE KNIGHT MK II (for compact)	Disc	£16 (d)
BATTLEFIELDS	Cass	£8.50 (d)
A VOUS LA FRANCE	Cass/EC	£17 (d)
	Book	£5.25 (d)
	Audio Cassettes (2)	£7.50 (a)
Additional charges for discs		£9.00 (d)
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	Book	£5.95 (d)
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Acorn FORTH.......£7.50
Acorn LISP.......£7.50
Acorn ISO Pascal Ref Manual.......£10.00
Intro to COMAL.......£10.00
Intro to LOGO.......£7.50
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Prog the Micro with Pascal.......£8.50
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Advanced Sideways Ram User Guide.......£9.95
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Mastering DOS plus.......£12.95

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Interfacing Proj for BBC.......£6.95
BBC and Small Business.......£5.75
The Software Business.......£5.50

Mastering Operating System (David Atherton).......£12.95

WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B
BBC Model B+
BBC Master 128
BBC Compact
6502 Second processor,
Turbo coprocessor
All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

WINDOWMATIC

All users of Acorn's VIEWSHEET speadsheet program will be aware of its powerful windowing facility which allows the screen and/or printer to be configured in up to 10 seperate windows taken from anywhere in the sheet. They will also be painfully aware of how difficult and time consuming it is to set up a required display. Although VIEWSHEET allows configurations to be saved to the media, it does not have provision for deciphering them.

WINDOWMATIC has been produced with the intention of rectifying these shortcomings and to bring out the very best from VIEWSHEET.

WINDOWMATIC provides a quick and easy way to configure screen and printer allowing complicated documents and reports to be set up much more easily. It displays complete text information on all 20 windows and accurate graphic representation of the screen and printer output.

The package includes a screen dump routine for Epson printers and allows use of other printer dump packages.

WINDOWMATIC is compatible with BBC Master and BBC B+. A 6502 2nd processor must be fitted to a model B to run Windowmatic. Windowmatic is fully compatible with Turbo and 6502 2nd processor.

The program is supplied on disc with a comprehensive manual.

VU-TYPE

Do you have finger trouble when typing?
Do your letters look like this:

Dear Sor,
I wuold like to .....

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

Available at a special price of £7.50(d) instead of the usual £15. Offer valid while stocks last

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover
Wordplay
Pantry Antics
Drawstick
Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25'' Disc £17.50(d)
3.5'' Disc £18.50(d)

(Normal RRP over £40)

PRINTER ACCESSORIES

EPSON ACCESSORIES:

Interfaces

8143 RS232.......£30 (d)
8148 + RS232 + 8k.......£65 (d)
8177P NLQ for FX80+/FX100+...£99 (d)

Parallel & Serial Buffers of various size also available.

LQ800 Tractor Feed.......£47 (b)
LQ1000 Tractor Feed.......£52 (b)

SHEET FEEDERS:

LQ800.......£135 (b)
LQ1000.......£179 (b)
FX800.......£135 (b)
FX1000.......£309 (b)
EX800.......£135 (b)
FX1000.......£179 (b)

Ribbons:

RX/FX100/100+, FX105.......£7 (d)
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LX80/LX800.......£4.50 (d)
LQ800.......£8.50 (d)
LQ1000.......£10 (d)
EX800/1000.......£7.50 (d)
H180 Pen Set (Aqueous/Ball point).......£8.25 (d)

HITACHI 672 Plotter

Aqueous Pen Set six pens...£18.50 (d)
Oil Based Pen Set six pens...£25.00 (d)

TAXAN CANON Accessories:

Ribbon, KP810/815/910/915.......£6 (d)

Star Printer

NL10 Sheet Feeder.......£52 (b)
NL10 Ribbon.......£4.50 (d)

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Spare Ribbon.......£4.50 (d)
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KXP3131 Sheet Feeder.......£189 (a)

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Tractor Feed.......£149 (a)
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NOVACAD

Computer Aided Draughting for the BBC Micro

"Novacad can drive a plotter to provide drawings of a high quality... Novacad is excellent. It is flexible, genuinely easy to operate without much practice, and a pleasure to use." **Beebug December 1986**

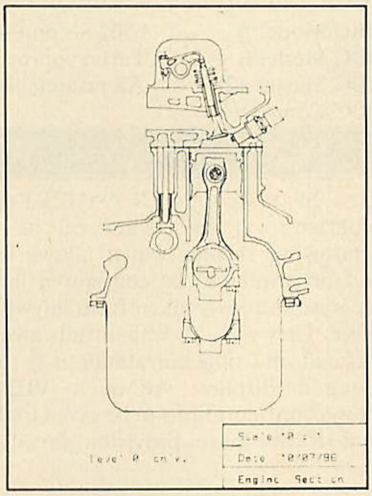
"Novacad is a professional package, well worth the £90 for the ROM and disc and is expandable to suit your own particular requirements. I would have no reservations if I heard Novacad called, "the best on the market"." **A&B Computing August 1986**

A sophisticated CAD package with unique facilities which are generally confined to the professional CAD packages costing thousands of pounds.

NOVACAD is being used in widely differing fields ranging from leading British industries for producing engineering drawings to Accountants' offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing professional quality output are making extensive use of NOVACAD's unique features. NOVACAD is proving to be a invaluable teaching aid in technical schools and colleges simply because of the ease with which it can be used.

NOVACAD'S MAJOR FEATURES

* Simple and easy to use with logical command sequence.
* A large drawing area (approx 15 screens).
* The ability to create complex icons (upto 500 lines instead of the usual 15 to 20 pixels), store them in a library and recall them at different scales and orientations.
* A zoom facility allowing magnification of up to 20 times to insert finer details.
* Block copy of shapes on the screen for repetitive use.
* Text entry at any 90° orientation at any position on the screen.
* Create multi layer drawing with 8 levels available.
* Full compatibility with the BBC range with minimal hardware requirements yet having the capability of exploiting the potential of the extra shadow memory or the second processor's memory and speed.
* Printer routine for Epson 80 and 136 column printers.
* A unique optional facility to output to any BBC compatible plotter.
* Cursor control from keyboard, tracker ball or mouse.



NOVACAD is compatible with all BBC models fitted with Acorn DFS. It has minimum hardware requirements of a single drive and a Epson compatible printer to get started though NOVACAD will utilise fully a dual drive system and 6502 2nd processor or the shadow ram on the B+ series. To obtain high quality drawings we recommend a BBC compatible plotter and our plotter driver generator.

With basic BBC B, NOVACAD operates in mode 4 allowing use of any 2 colours. With shadow memory of the BBC+ or the Master, it can also operate in mode 0 for higher resolution or mode 1 for allowing use of any 4 colours, and it will provide additional user memory for more complex drawings.

6502 second processor or the Turbo on the Master will also increase the drawing speed considerably.

NEW REDUCED PRICE

£49(d)

Plotter Driver Generator £15(d)

OPTIONAL EXTRAS

Plotter driver generator is available as an optional extra to configure a plotter routine for any BBC compatible plotter. Pre-configured programs for the popular plotters like **Epson HI 80, Hitachi 672, Plotmate, Penman** and **HP GL.** This program allows the drawing to be scaled to the maximum plotter size thus enabling drawing of A2 and A3 sizes to be produced with equal ease. The zoom facility will enable inaccuracies of drawing on the screen to be eliminated.

BBC SPARE PARTS

BBC B & General

Power Supply	£52.00 (b)
Keyboard Connector	£5.00 (d)
Complete Keyboard	£52.00 (b)
Keyswitch (state type)	£1.75 (d)
Modulator UM1233	£4.80 (d)
Video ULA	£18.00 (d)
Serial ULA	£14.00 (d)
1.2 OS	£15.00 (d)
BASIC II ROM	£22.00 (d)
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ADFS ROM	£26.00 (d)
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4816 RAM	£2.50 (d)
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16 MHz Xtal	£12.50 (d)
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6522A	£5.50 (d)
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88LS120	£6.50 (d)
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NE555	£0.50 (d)
68B50	£2.50 (d)
74ALS245	£5.00 (d)
WD1770	£24.00 (d)
68B54	£8.00 (d)
75159	£2.20 (d)
76489	£4.00 (d)

BBC B +

Keyswitch (state type)	£1.75 (d)
Modulator UM1233	£4.80 (d)
B+ OS	£18.00 (d)
4864-12	£3.00 (d)
PAL16RH	£18.00 (d)
1770 DFS ROM	£17.50 (d)

BBC MASTER

Power Supply	£65.00 (b)
Keyboard Connection	£3.75 (d)
Keyboard	£65.00 (b)
Keyswitch (state type)	£1.75 (d)
1 Mb OS ROM	£39.00 (d)
CF30060 ULA	£10.00 (d)
CF30047 ULA	£15.25 (d)
CF30048 ULA	£15.25 (d)
CF30049 ULA	£15.25 (d)
CF30050 ULA	£19.75 (d)
CF30058 ULA	£15.00 (d)
6818	£4.00 (d)
65SC12	£15.66 (d)
50464	£3.50 (d)
74F00	£1.00 (d)
74F74	£1.40 (d)
74HCT253	£3.50 (d)
9637	£2.00 (d)
32.768 MHz Xtal	£2.00 (d)

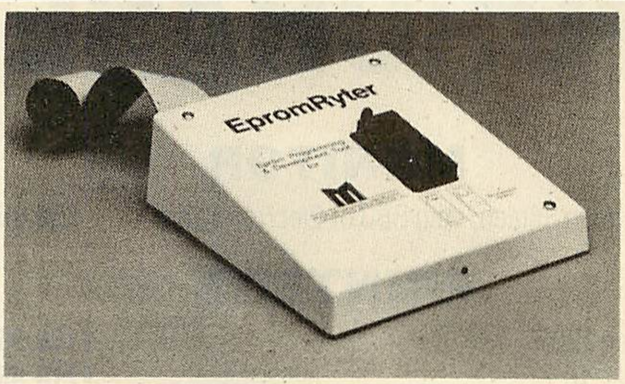
2nd PROCESSORS

ULA (512)	£34.00 (d)
ULA (6502 & Z80)	£28.00 (d)
Power Supply	£42.00 (b)

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EpromRyter



***Highly sophisticated & Advanced Programmer**

***Handles all current 1 rail Eproms**

***State of the Art Programming Algorithms**

EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1 MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
- 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
- One time eproms P27XXX, 87CXXX etc.
- Also A suffix eproms such as 27XXXA

The main features of the programming software are:

* Device, function and voltage selection from the computer keyboard.
* Continuous display of the options selected.
* All eproms upto 27512 (64K) programmed in single pass.
* Automatic Intelligent identifier support for eproms able to respond.
* Selectable programming voltage 25/21/12.5V
* 3 programming methods: Normal, Intelligent & Pulse (30 sec for a 27128).
* Serial port protocols supported incl Intel Hex & Motorola S.
* DFS, NFS, ADFS and Rom Filing System Supported.
* BASIC/Machine Code programming using RFS.
* Powerful editor with input in HEX or ASCII. * Full editable 64K file.
* Block move of data within the address range.
* User can select any section of the eprom from single byte to the full address range to blank check/burn/verify. Facility to program single bytes makes program development/amendment simpler.
* Multiple loading for ROM Filing System

Some of the above features apply to Master Computers only

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request.

META Version III

"All the good features you would expect to find in a good source code editor are present . . . Meta assembler lives in a different world. It is structured to work with any new processor . . . as new instruction sets can be added . . . as needed . . . has a well featured editor with colour highlighting, a sound modular approach."
Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc — and 68000 — using hative mnemonics for each processor, eg. LD A, (HL) for Z80 and MOV AO, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassemblers.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc — all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF supression/addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-band manual, function-key strip.

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second — No "erase" time.
- 28 pin header plugs into Eprom socket on target system — status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
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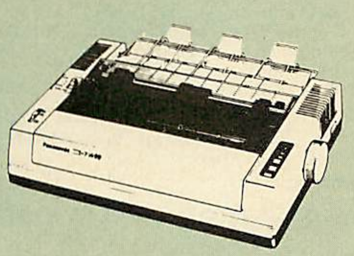
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Continued →

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- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

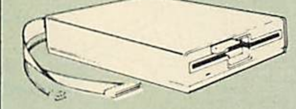
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£25.00**.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

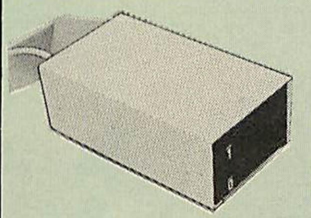
SPECIAL DISC DRIVE/DDFS OFFER

Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)



3½" DISC DRIVE OFFER

These top quality 3½" Disc Drives are attractively finished in BBC beige and are supplied complete with Cables. They run directly from the BBC B/Master's own PSU.

- Single 400K Drive **£69**
- Twin 800K Drives **£126**

MYSTERIES OF DISC DRIVES & DFS REVEALED (BOOK)

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

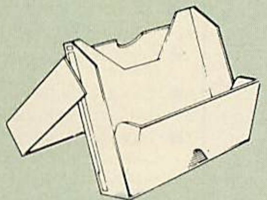
£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection –
Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£6.50**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25** – holds upto 25 3½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**





PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

PLONKER BOX

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost PLONKER BOX. It holds up to eight 5¼" Discs.

Protection at Only: **£2**



DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

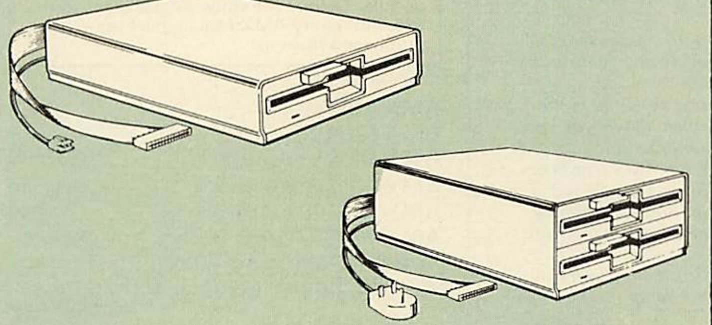
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. *(Turn to the 6th page of our advert for the Plinths).*

P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £90		CS 200 £102	
400K (720K)	CLS400S £92	CLD 400 £175	CS 400S £103	CD400 £196
800K (1.44M)		CLD 800S £179		CD 800S £198

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes* ***£8.50***
- *10 × 5¼" D/S D/D 40 Track Diskettes* ***£10.50***
- *10 × 5¼" S/S D/D 80 Track Diskettes* ***£13***
- *10 × 5¼" D/S D/D 80 Track Diskettes* ***£13***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£28***
- *10 × 3½" S/S D/D 40/80 track Discs* ***£15***
- *10 × 3½" D/D D/D 40/80 track Discs* ***£19.50***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

- *10 ×* ***M3*** *3½" D/S D/D 80 Track Discs* ***£18***
- *10 ×* ***M4*** *5¼" S/S D/D 40 Track Discs* ***£7***
- *10 ×* ***M5*** *5¼" D/S D/D 40 Track Discs* ***£9***
- *10 ×* ***M7*** *5¼" D/S D/D 80 Track Discs* ***£11***
- *3" Double Sided Discs* ***£3 each***

Special BULK OFFER on 5¼" DISCS



(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

ACORN WINCHESTER DRIVES

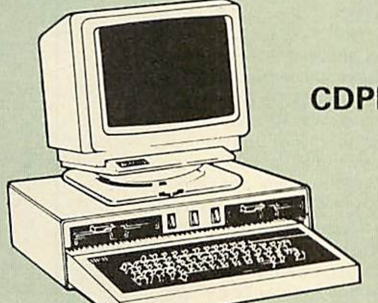
Supplied complete with Level 3 Econet File Server software.
20 Megabytes **£699**; **30 Megabytes £1549**

WATFORD's WINCHESTER DRIVES



- 10 Megabyte Unit with ADFS **£399**
- 20 Megabyte Unit with ADFS **£499**
- 40 Megabyte Unit with ADFS **£749**

CDP800S **CDPM800S**



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £199
CDPM 800S for Master £205
(Securicor Carr. £7)

ACORN'S Twin 800K Disc Drives

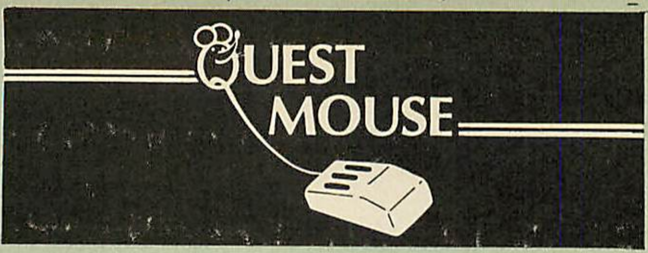


Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.

RRP ~~£250~~ **Our Price: Only £189** (carr £7)

NOMINATED FOR

MICRO COMPUTING BRITISH AWARDS 1987



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and is smooth and easy to use on most work surfaces. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that programs such as AMX Pagemaker etc, will work with it.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package
With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package. . ."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMZ, Wigmore and the rest . . ."
". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 24 text FONTS for use within Quest Mouse.
P.S. There is no need to worry about any of your existing AMX mouse software. The Quest Mouse is totally AMX compatible so it will work with any of the AMX range of software.

All prices in this advert are exclusive of VAT.

MARK II LIGHT PEN + PENPAL 2

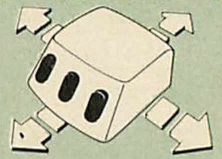
Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.
Penpal II, Watford Electronics' sophisticated light pen software is also supplied free on cassette or disc (*please specify*). This is a highly sophisticated drawing package enabling you to gain the maximum benefit from your Light Pen. The software is used to edit Mode 2 full colour screens using lines, patterns and you own designs. Screens may be saved to cassette or disc.

Price Only £15

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

VISA

THE AMX MOUSE



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £59 (carr £1.50)
(Please specify for BBC or Master Computer)

We are giving away, absolutely **FREE**, our popular Colour Art software package worth **£15** with every AMX Mouse package purchased from us.

AMX MAT	**£3**
AMX MOUSE ONLY	**£29**
AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.00**
AMX SUPERART Package	**£39**
AMX PAGE-MAKER Pack – A desk-top publishing software. It Works with keyboard, joystick and a mouse	**Only: £32**

We are giving away, absolutely FREE, PAGE-FONTS, a disc containing over 20 fonts, with every purchase of AMX PAGE-MAKER from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	**£9.50**
AMX DESIGN (ROM)	**£59**
AMX 3D ZICON Disc	**£19**
AMX Database Disc	**£19**
AMX Stop Press	**£39**
AMX XAM Educational	**£19**
AMX MAX A gem of desktop	

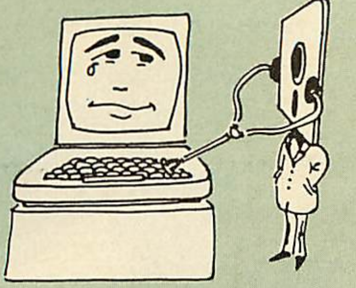
RB2 Marconi Tracker Ball

Complete with Software Disc	£59
RB2 + Software Disc + Quest Paint	£85

FLEET STREET EDITOR

Software pack for BBC/Master	**£36**
Software Pack for Compact	**£40**
Admin Xtra Disc Utility	**£13**
Walt Disney Disc Utility	**£13**
Fonts N Graphics Disc Utility	**£13**

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

OFFICE MASTER



CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

TED

THE ULTIMATE TELETEXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities, Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety ofstyles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatable mODE 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequencially, making it ideal for creating andrunning 'Viewdata' information systems. Over 1200 frames may bestored on a twin 80 track drive. A unique feture of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

ROM-SPELL

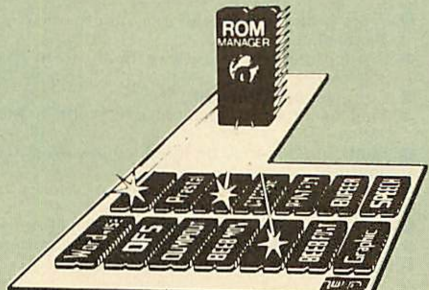


Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

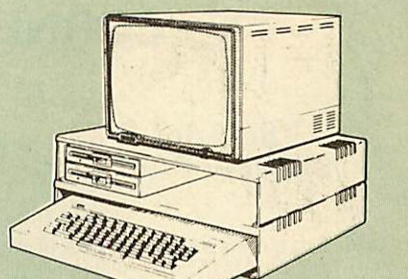
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)

Angle poise **£14** (carr. £3)

Continued →



ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

Price: **£80** (carr. £2(

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	£40
	Aries B-12C	£5

ARIES B-488 IEEE-488 INTERFACE UNIT

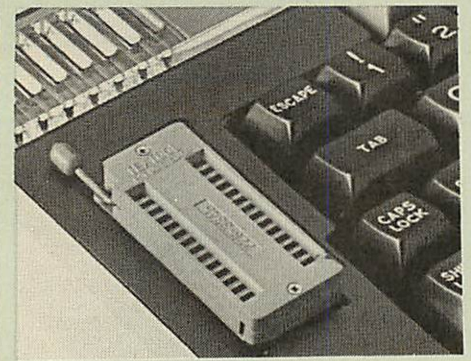
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

GRAPH PAD 2

Supplied complete with Software
£60 (Carr. £3)

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£15** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack.

● Complete System	£11
● Spare Cartridges	£2.50
● Spare Rack	£1.50

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

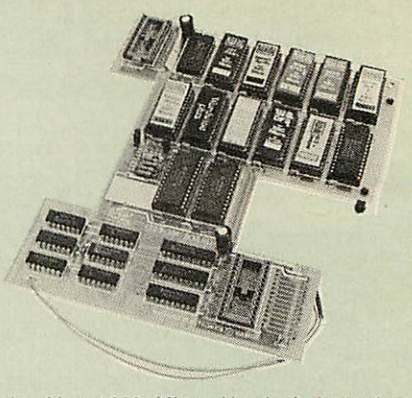
Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

All prices in this advert are exclusive of VAT.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

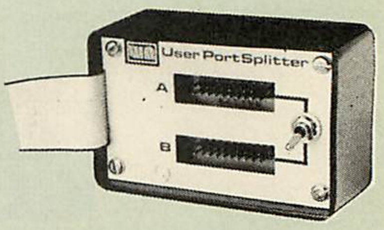
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

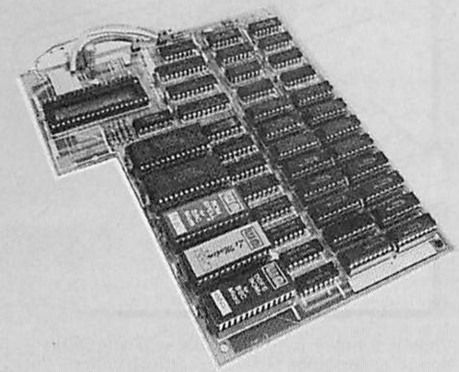
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£19**

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- *ROM/RAM card with 32k dynamic RAM **£39***
- ROM/RAM card with 64k dynamic RAM **£52**
- ROM/RAM card with a massive 128k dynamic RAM **£80**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- *16k plug-in Static RAM kit **£6***
- *16k Dynamic RAM for Upgrade **£7.50***
- *Battery backup **£3***
- *Read and Write protect switches ...... **£2** each*

*Complete ROM-RAM board All options installed **£89***

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £10 less

Le Modem



The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£84***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Nightingale Modem

SPECIAL PRICE to our Customers

£82

(Price includes: Nightingale Modem, Commstar ROM pack & Comprehensive manual)

Nightingale Modem without software **Only £75**
COMMSTAR ROM package only **£29**
(P&P on modem £3.00)

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£84** **(Carr £3)**
(Write in for full specification)

Minerva Systems Software

System Delta with Card Index	£55
System Programmers Ref. Guide	£19
System Gamma	£43
System Gamma Prog, Ref, Guide	£19
System Mailshot	£17
System Reporter	£17
System Intrer/View Link	£17
System Sales Ledger	£39
System Purchase Ledger	£39
System Nominal Ledger	£48
System Stock Management	£39
Order Processing/Invoicing	£39

Versatile **BEEB SPEECH SYNTHESISER** Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise £24

Wordwise plus

WORDWISE PLUS
£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £47

Inter SHEET ONLY £37

INTER CHART ONLY: £26

Inter-WORD
Only: **£39**

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£37
VIEW 3.0 ROM	**£54**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	**£36**
VIEW Printer Driver Generator Please specify Disc or Cassette)	**£9**
VIEWSHEET (Acornsoft)	**£37**
VIEWSTORE	**£37**
VIEWSPELL with 80 track disc	**£29**
VIEWPLOT Disc (Please specify for Master 128 or Compact)	**£22**
VIEW-INDEX	**£12**
OVERVIEW Packs 1 & 2 for the Master	**£75**

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn **£43**

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29
Adv. Rom Manager	£13

MINI OFFICE II

Disc Version	£14.50
ROM Version	£48.00

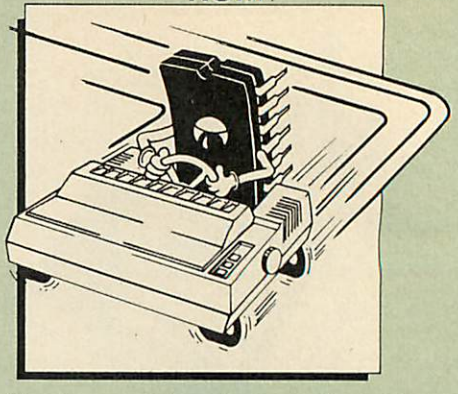
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33



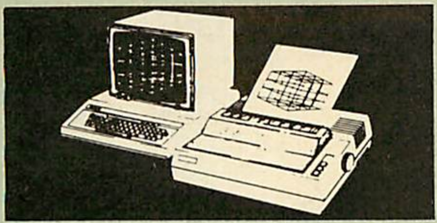
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:
- *Vertical and horizontal scaling in all graphics modes and mode 7*
- *Rotation of image by 90, 180 or 270 degrees*
- *Left hand margin setting*
- *Screen dump window setting*
- *Colours appear as grey scale*
- *Two tone fast dump*
- *Colour mask*
- *Mode 7 contrast expansion*
- *Mode 7 contiguous dump*
- *Key triggered and User Port triggered dumps*

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro ... it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1080, Mannesman Tally and compatibles.

Only: £25

(Write in for further details on all above ROMS)

THE EUREKA CARD

(The Unique RAM Expansion System)

The Eureka Card is Watford's latest and most sophisticated RAM expansion system. Using advanced PAL based technology this card is a breakthrough in RAM systems for the BBC micro. The Eureka Card provides the user with around 58K of free memory in Basic, VIEW and WORDWISE PLUS. You also get Shadow RAM from within the active language. No other RAM expansion system can match that!

Load up to 58K long Basic programs. Texts in VIEW and WORDWISE PLUS up to 58K as well. This with absolutely NO loss of speed in accessing your text or program. Eureka consists of a card containing 64K of program memory, two parallel banks of sideways RAM and some extremely complex switching circuitry. This is all controlled by Eureka's highly sofisticated software supplied in ROM. Designed to a very high specification, this board is fully buffered to give reliable operation under virtually any circumstances.

The Eureka board plugs into the 6502 socket and has NO messy flying leads. It is compatible with many other products from Watford, such as our Solderless ROM Board and our ROM/RAM Board. All in all, the Eureka Card is an amazing board. Jump into the age of serious data processing with a Eureka Card! Please write in for further details 'on advantages the Eureka can offer you'.

Introductory price: Only **£89** (carr £3)

(P.S. Eureka is only suitable for a standard model B; it normally replaces any Shadow RAM cards present. Some speed degredation does occur with filing system access. Eureka cannot be used at the same time as a second processor).

BEEBMON

The most powerful machine code monitor for the BBC Micro **£24**.

THE NLQ DESIGNER

(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. Please specify 40 or 80 track. Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- *NLQ Designer ROM & FONT Disc* ***£25***

ADDER



Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:
- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£3 Carr)

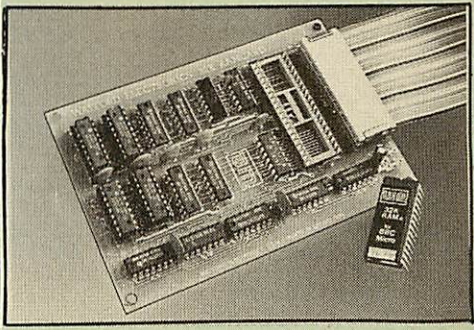
TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.
- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

See next page for SPECIAL OFFER

Only £59 (carr £2)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued →

BOOKS (No VAT on Books)

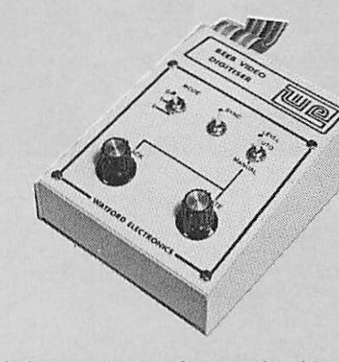
15 Hr Wordprocessing BBC/View	£3.95
15 Hr Wordprocessing BBC/WW & WW+	£3.95
30 Hour BASIC (BBC Micro)	£7.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development Package	£7.50
6502 Reference Guide	£9.95
68000 Assembly Lang. Programming	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£16.95
6809 Machine Code Programming	£7.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£16.95
Advanced Disc User Guide	£16.95
Advanced BASIC ROM User Guide	£9.95
Advanced Programming Guide to BBC	£9.95
Advanced Sideways RAM User Guide	£10
Advanced User Guide for BBC	£10.95
Advanced FORTH	£9.95
Advanced Graphics with BBC	£9.95
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Applied Assembly Lang. for BBC	£9.95
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£14.95
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Language Programming on the BBC & Electron	£8.95
Basic ROM User Guide	£11.95
BBC B Compendium	£5.95
BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Micro Programming Tips	£8.95
BBC Micro & the small Business	£5.75
BBC Micro Programming Tips	£8.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BBC Micro Disc Companion	£8.95
BBC Software Projects	£6.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C for Beginners	£10.95
C for Programmers	£9.95
Complete FORTH	£6.95
Computer Graphics & CAD fundamentals	£9.95
CP-M-86 User's Guide	£19.95
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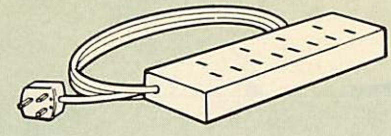
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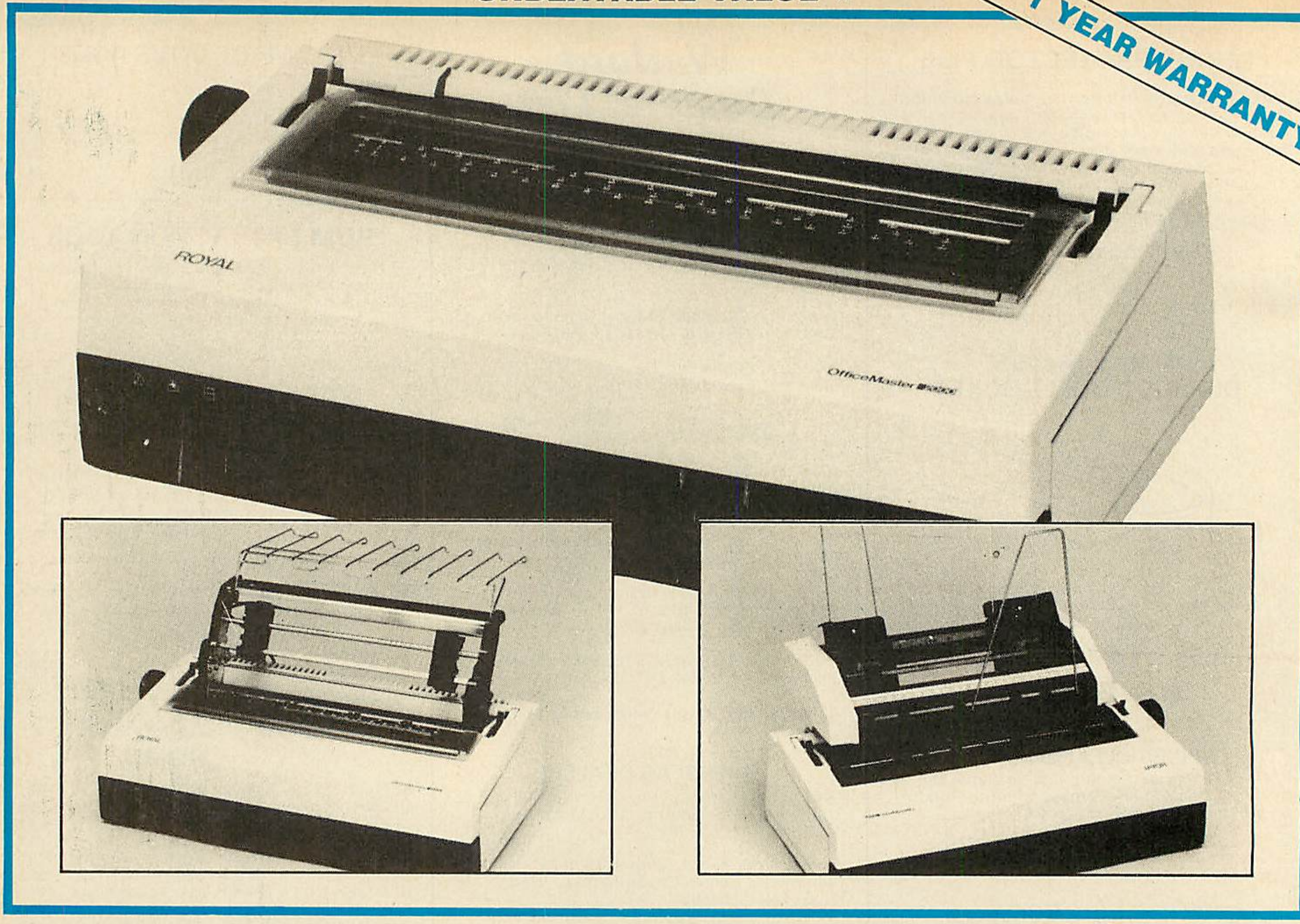
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Print Buffer:	1500 characters (bytes) Option: 3500 characters
Paper Passage:	360 mm
Print Width:	302 mm
Number of Copies:	4 (1 original and 3 copies)
Line Spacing:	Standard feed 1/6 in. (4.23 mm) programmable in basic steps of 1/48 in. (0.53 mm) or 1/96 in. (0.26 mm)
Form Length:	Standard values adjustable by BCD-switch over software the multiple of line spacing
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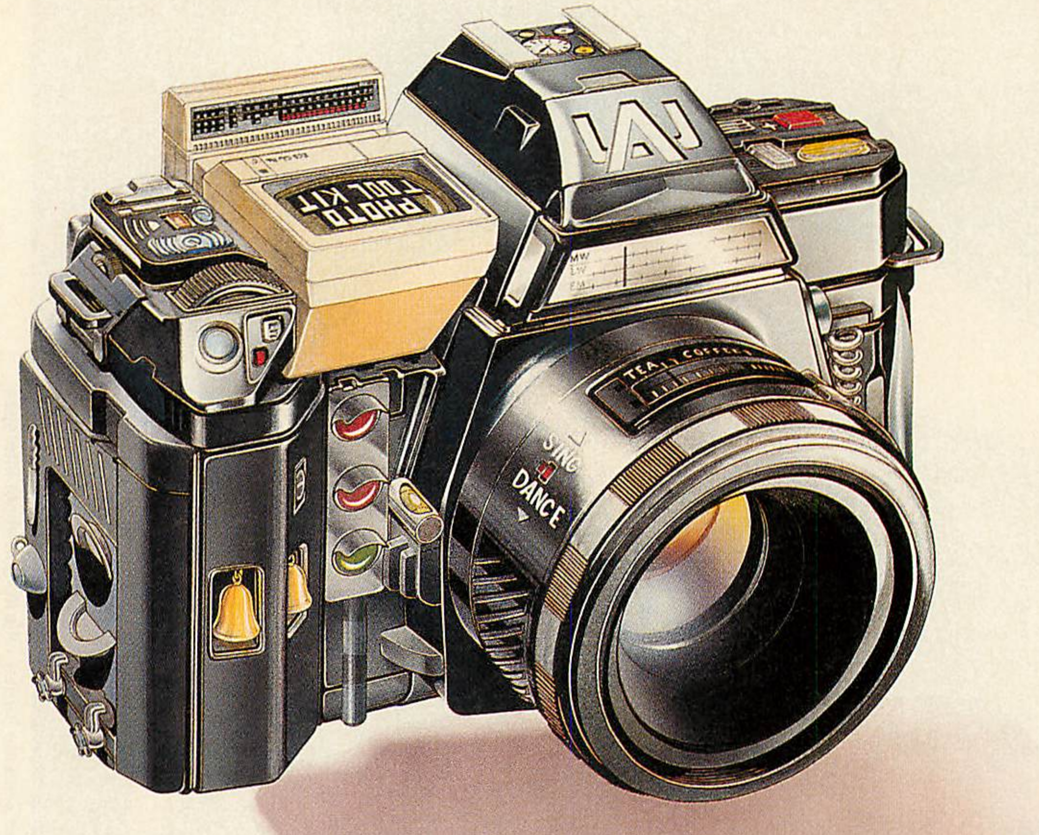
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A toolkit is a little collection of utilities to do disc formatting, memory editing and program compacting. Originally most toolkits were written for boffins who spent their life assembling machine code, and wrecked their disc so often they had to learn how to rebuild disc sectors. Newer utility software has become less technical; the *Genie* system and *Acorn User*'s own *Jottings Operating Environment* for example. Yet there still is a place for the toolkit, as a notepad, memory jogger and aid for specific applications.

Although most toolkits were written in machine code, Basic will function just as well, and it's much easier to write your own utilities.

Many toolkits operate on a command basis, so '*WRECK 80 0 1' might be the command which would wreck both sides of an 80-track disc. Most toolkits rely on the manual to explain how each command is used. By using Basic, we can make any toolkit much more friendly.

We will start with a core toolkit which we can use for any application. Once that's working, we can add specific features.

The approach taken in listing 1 on the yellow pages, the framework or core for the toolkits, is to use a command language. This way, the toolkit facilities are available on typing a word which the computer interprets into a command plus one or more parameters. The basic vocabulary used by listing 1 includes:

COMMANDS (no parameters)
EXPLAIN (one string parameter)
EXIT (no parameters)
TRACE (one string parameter)
PRINTER (one string parameter)
KEY (one number, one string)

Figure 1 shows the program outline, and how it processes a single command. The program prompts for a command with a ']' and then converts the string typed to capital letters with FNprocess. The end of the string is marked with the broken bar character '¦'. The first whole word is extracted by FNextract and placed in the variable com$. This is shortened so any command can be issued just by typing the first four letters, and PROCdecodecommand works out which command it is.

COMMANDS simply calls PROCcommands, which prints a list of the available key words. EXIT ends the program and returns to Basic. EXPLAIN can be typed by itself, but normally requires another command, eg, 'EXPLAIN COMMANDS'. Once EXPLAIN is decoded, PROCexplain is called. Now the rest of the entry line is considered and the next

whole word extracted and placed in para$.

We use para$ throughout when looking for parameters. This parameter is reduced to the first four letters, and decoded in a similar way to the command. The procedure called is identified by having 'ex' prefixed to it, so if the command 'EXPLAIN EXIT' is typed, the procedure called will be PROCexexit, while if the 'EXIT' command is entered, the procedure will be PROCexit. Maintaining the consistency of names is important when we begin to extend the program framework.

TRACE is a command which takes one parameter which must be either 'ON' or 'OFF'. TRACE allows the toolkit's command and parameter decoding to be shown on screen. This is useful when checking that new commands they are being decoded properly. PRINTER uses 'ON' and 'OFF' as parameters. The effect of 'PRINTER ON' is to copy everything that is displayed on the screen to a printer. 'PRINTER OFF' stops this. Because of the problems with colour control codes on some printers, the 'PRINTER ON' command removes the mode 7 colour display, while 'PRINT OFF' restores it.

The last command is KEY, and this takes two parameters, a number from zero to nine (though 10 can be added if necessary) plus a string. KEY acts like *KEY, so 'KEY 0 EXPLAIN' and 'KEY 1 COMMANDS | M' are both legal. So too is 'KEY 2 TRACE ON | M'.

For the Electron try changing all MODE 7s into MODE 6s and then replace all references to PROCcolours with PROCblanks.

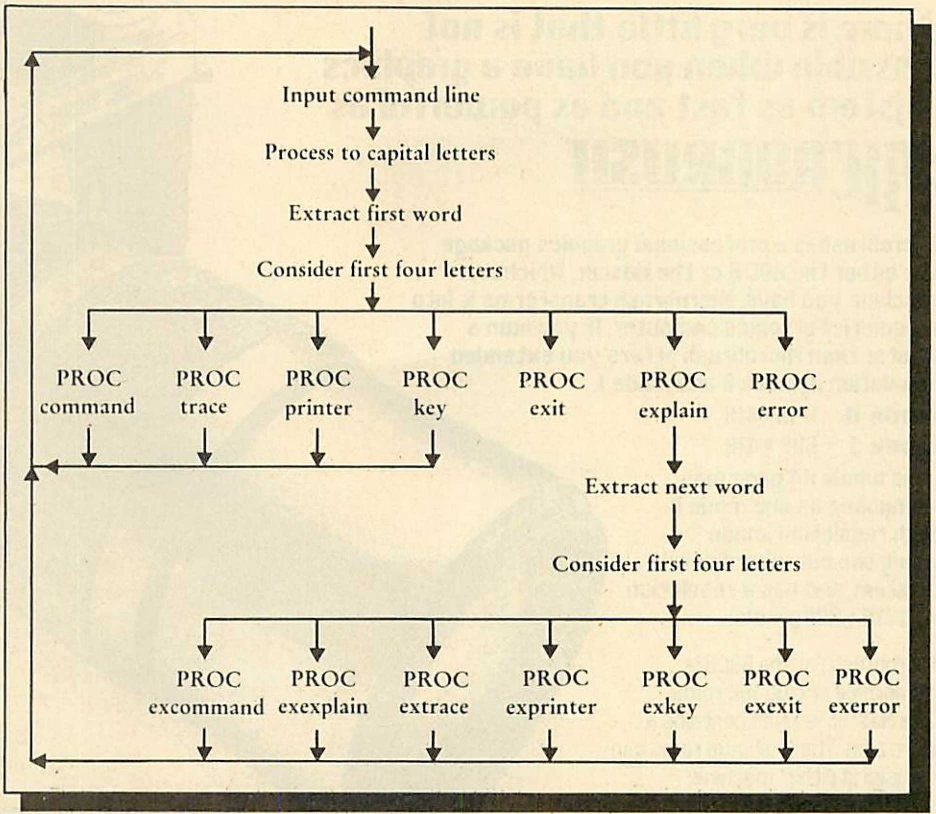


Figure 1. Framework of the toolkit program

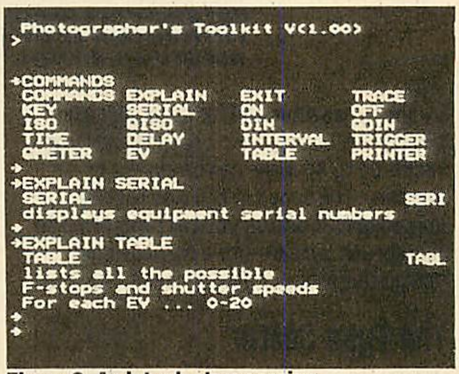


Figure 2. An introductory session

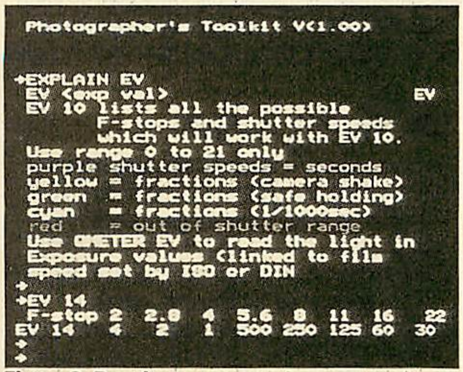


Figure 3. Running some complex commands

The photographer's toolkit

The main program is listing 2 in the yellow pages. This is a toolkit for a photographer, but even if you are not photographically inclined, the program will serve to show how a toolkit can be expanded.

Once you have entered the program, then type RUN. The title 'Photographer's Toolkit V1.00' will appear at the top of the screen and the ']' prompt (which is an arrow in mode 7) appears. Now type COMMANDS and the list of commands in figure 2 will appear. EXPLAIN followed by a command will say what it does.

The new photographic commands fall into three groups; information handling commands, timing and control commands and data acquisition commands.

Information handling commands include SERIAL, ISO, DIN, EV, TABLE, QISO, and QDIN. Typing SERIAL gives a list of serial numbers of photographic equipment. These numbers won't match your equipment, so EXIT from the program and list it, until you find DEFPROCserial, then alter the PRINT statements to match your equipment.

The other commands should need no alteration. ISO followed by a number sets the ISO film speed rating. DIN does the same thing, using the other film speed standard. QISO and QDIN print out the currently set film speed rating as an ISO number or a DIN number respectively. ISO and DIN are linked together, so typing ISO 200 will automatically set DIN to 24, and vice versa. EV followed by a number from zero to 21 gives a list of matching shutter speeds and apertures (f-stops) which combine to make up the exposure value. So EV14 will give a 30th of a second at f22, a 60th at f16, a 125th at f11 and so on. The TABLE command goes one step further and lists every shutter/f-stop combination from EV0 to EV20. This is shown in figure 7. Unfortunately, screen size in mode 7 means that speeds have to be colour coded, and while this is all right on the screen, it can't be printed out properly on paper. Note that below EV2 the numbers are all whole seconds. The 1, 2 and 4 of EV12 onward are actually 1000th, 2000th and 4000th of a second speeds. Other functions are shown in figures 2 and 3.

Timing and control commands include ON, OFF, TIME, DELAY, and INTERVAL. They all act on the cassette port relay, and so it is important to be able to connect whatever you are timing to that point. Figure 8 shows how this can be done simply using a small 2A terminal block (costing about 4p) and a nine-pin DIN cassette plug (45p). The terminal block can be used to

connect a wide range of switchable devices to the computer including cameras, flash-guns and enlargers.

It is not possible to give precise construction details for the full range of photographic equipment. There are, however, some rules which you should follow:

- Only connect low voltage, low current devices to the cassette port relay, or you'll have a repair job on your hands.
- When connecting cameras, only connect to a camera with a remote electronic release. Buy a proper lead and connector for the camera. Cut the lead and find the two wires which trigger the camera when they are shorted. Connect them to the terminal block and the computer will be able to trigger the camera.
- When connecting anything else, use a second relay to protect the cassette relay. This is shown in figure 5. The best relays have a 185-ohm coil and will operate at less than 6V. Either use a battery or the BBC power supply to power them.
- When connecting a flash gun (figure 4) remember it might just have a voltage at the switch of 300V, though most modem units are only 6-9V. You don't want to get a shock or burn out the relay, so cover the relay terminals, or box the relay, and make sure its contacts can take mains voltage at a current of about 1A.
- Still with flash guns, buy a proper lead to fire the flash, and cut it to find the trigger wires. These connect to the relay (via another terminal block).
- For a mains enlarger remember the points above. The relay and connections *must* be boxed. All wires *must* be properly insulated, and the enlarger (if metal) *must* be properly earthed. If you have the slightest difficulty in building such an interface, or if you are at all unsure, have it done by a qualified electrician. Mains voltages are lethal and neither the author nor Redwood Publishing Ltd can accept any responsibility for damage to person or property resulting from construction work based on this article.

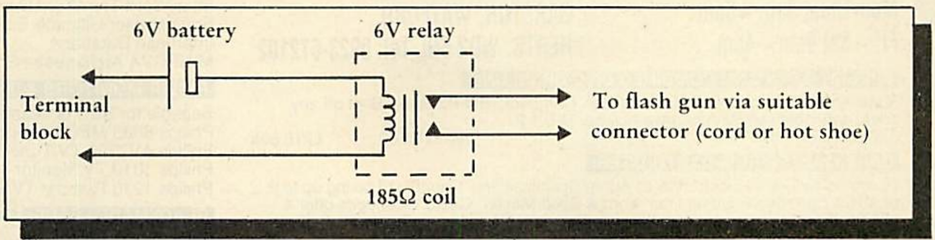


Figure 4. Connection to flash unit

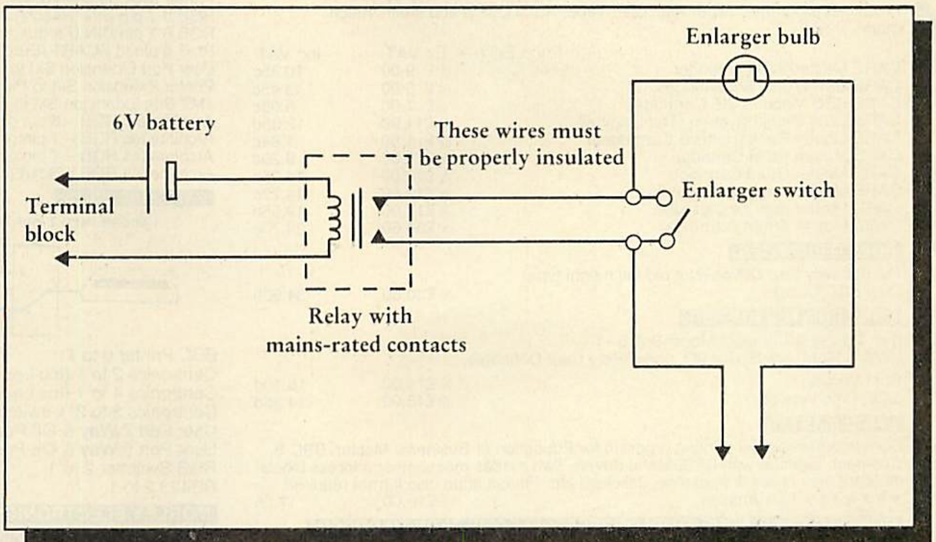


Figure 5. Connection to enlarger

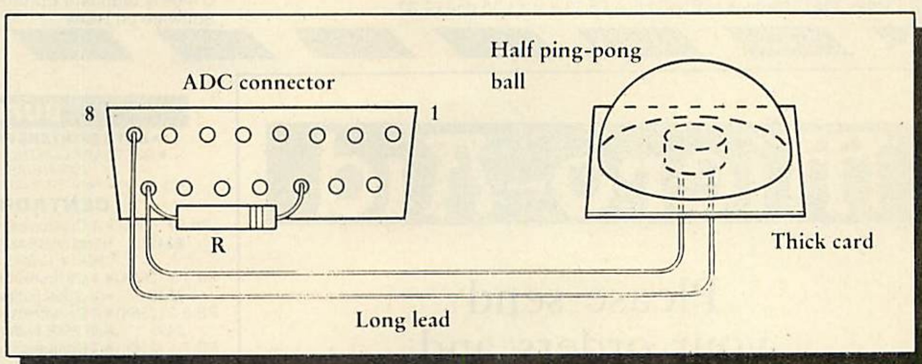


Figure 6. Hardware for a light meter for use with the QMETER command

Once the interface is built then the controlling commands can be tried. ON and OFF are simple commands which replace switches with key presses. Try 'KEY 0 OFF ¦ M' and 'KEY 1 ON ¦ M' to give single keypress operation. TIME is another simple command. You can time your enlarger exposure by typing 'TIME 10', and a precise 10-second exposure takes place. DELAY is another command. Typing 'DELAY 30 S 1' will wait for 30 seconds then close the cassette relay for one second. The delay can be in seconds minutes (M) or hours (H). The last command is decoded in figure 4. The INTERVAL command acts like a delay command but can be repeated as many times as need be. To take pictures of a flower opening in your garden every half-hour for a day type 'INTERVAL 30 M 1 7' and a one second blip of the cassette port will occur every 30 minutes.

Constructing a lightmeter

Of the data acquisition commands, the main command which we use is QMETER. Unfortunately Electron and Compact owners without analogue ports will not be able to make use of the QMETER command. QMETER is, of course, useless without a light cell to meter from.

Figure 6 shows the construction of a simple light meter. The components needed are; a connector for the analogue port (£1.75), a 4.7kΩ resistor (1p), an ORP 12 light-dependent resistor (80p), half a ping-pong ball (14p) and some wire and solder. The total cost is about £2.70, and all should be available from a High Street electronic hobbyists shop.

The software acts as a low light (EV0 to EV11) light meter. The first version only worked using 'QMETER ABS' which returns a light reading from zero (bright) to 256 (dark). The half ping-pong ball was used to cover the light-dependent resistor to give an incident reading, so that the cell could be pointed divertly at a light source and the light from that source could be measured – this is a standard photographic technique for getting good exposures. Once the 'QMET ABS' command was working I took simultaneous readings with

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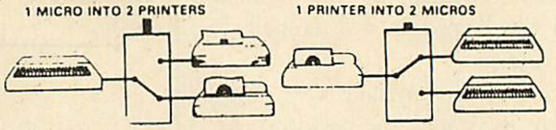
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a borrowed light meter and the light cell, and drew up a table of exposure values to calibrate the home-made meter, like so:

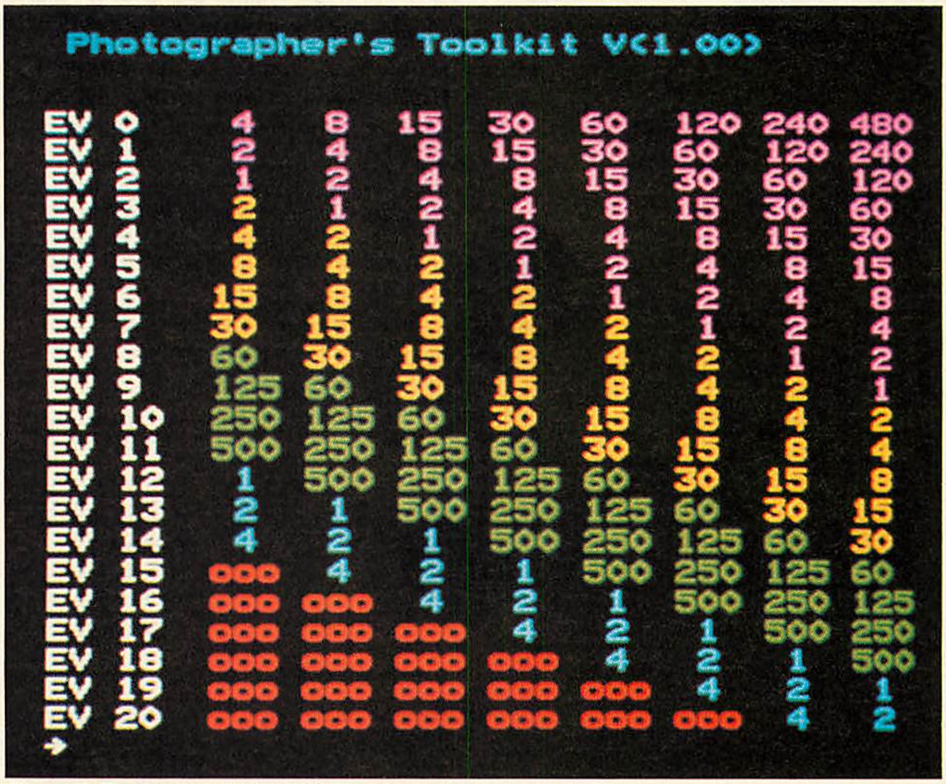
Light Meter	QMET ABS
EV0	210
EV1	188
EV2	167
EV3	135
EV4	110
EV5	96
EV6	60
EV7	43
EV8	30
EV9	20
EV10	12
EV11	7

Beyond EV0 and EV11, the light meter readings were not sufficiently stable. Every light dependent resistor is an individual, so look in DEFPROCsetup for this table of values in a DATA statement and alter them to suit your home-made meter.

Once calibrated, and the new DATA statements have been re-entered, you can use the command 'QMET EV' to generate an exposure value based on the light level. The EV parameter is linked to the film speed so if you QMET EV with ISO 100 film and get EV6 as the reading, changing to ISO 400 film will change the reading to EV8, because of the film speed.

It would be straightforward to design a further command, say QENLARGE, which would return a number of seconds based on the light read by the photocell when placed under an enlarger with a negative in place. The hardware would have to be altered by making the resistor larger (100kΩ), so the system was more sensitive to light. Removing the ping-pong ball cover would help too, but you would have to ensure the photocell reads the average density of the negative, perhaps by holding a thin sheet of greaseproof paper under the enlarger lens. The calibration technique would be to make test prints after each of four, six, eight, 12, 16, 24, 32, 48 and 64 seconds exposure, changing the aperture to get a good print. When a good print is achieved record the 'QMET ABS' reading and build up a table, eg.

Exposure time	QMET ABS
4 secs	10
6 secs	15
8 secs	20
12 secs	27
16 secs	40
24 secs	60
32 secs	92
48 secs	120
64 secs	180



Photographer's Toolkit V(1.00)

EV 0	4	8	15	30	60	120	240	480
EV 1	2	4	8	15	30	60	120	240
EV 2	1	2	4	8	15	30	60	120
EV 3	2	1	2	4	8	15	30	60
EV 4	4	2	1	2	4	8	15	30
EV 5	8	4	2	1	2	4	8	15
EV 6	15	8	4	2	1	2	4	8
EV 7	30	15	8	4	2	1	2	4
EV 8	60	30	15	8	4	2	1	2
EV 9	125	60	30	15	8	4	2	1
EV 10	250	125	60	30	15	8	4	2
EV 11	500	250	125	60	30	15	8	4
EV 12	1	500	250	125	60	30	15	8
EV 13	2	1	500	250	125	60	30	15
EV 14	4	2	1	500	250	125	60	30
EV 15	000	4	2	1	500	250	125	60
EV 16	000	000	4	2	1	500	250	125
EV 17	000	000	000	4	2	1	500	250
EV 18	000	000	000	000	4	2	1	500
EV 19	000	000	000	000	000	4	2	1
EV 20	000	000	000	000	000	000	4	2

→

Figure 7. The exposure value table

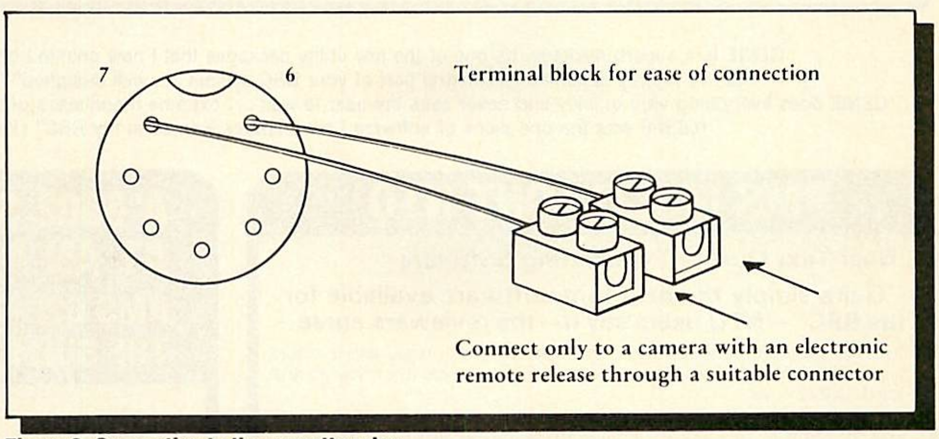


Figure 8. Connecting to the cassette relay

This can then be put into a DATA statement in PROCsetup, and read into a nine element list say DIMenlarger (9). Finally a PROCenlarge procedure can be added, almost exactly like PROCqmet but without parameters. PROCexenlarge can be added to explain how the command works. The points to be considered when adding a toolkit command are:

- Choose the name, eg, DEVELOP
- Add it to PROCcommands
- Check for 'DEVE' in PROCdecodecommand
- Check for 'DEVE' in PROCexplain
- Write DEFPROCexdevelop to explain what it does
- Write DEFPROCdevelop
- Extract the parameter with FNextract and convert it to a number
- Check for para$="" or time=0 and call PROCerror & ENDPROC
- Continue writing to ENDPROC.

You can combine the metering facility with the control commands, by using TRIGGER. This command requires two parameters; one refers to the absolute light level at which triggering takes place and the second is the direction of the change of light level, (B)righter or (D)arker. If 'QMET ABS' returns 50, then that is the current light level. To trigger a flash or camera when the light drops we use 'TRIGGER 51 D'. The 51 is protection against slight dimming of the light, and the D says wait till it gets darker than 51, the cassette relay is blipped for half a second and the photo is taken.

The photographer's toolkit is just one application for the system – if you come up with any others let me know!

CHOOSE YOUR WORDS WISELY

Setting up *Wordwise Plus* can be time consuming, but making choices with !BOOT files is difficult. Here's how to do it

Philip Trinham

You bought *Wordwise Plus* for the programming language – what else do you with a word-processor? But all those support programs you've written need loading into memory before you start, and loading each of the segments can take quite a time. You can use a menu program in Basic and a series of exec files to speed the process up.

Wordwise Plus is a very flexible word-processor, but there is a lot of typing to do before you actually get around to processing any real words. You normally start by entering several star commands, selecting which disc drive and directory, disabling all those add-ons you bought to make things easier, and then typing *WORDWISE. Then you have to define all the function keys to your preferred settings, so that you can use CTRL-Shift plus a red key to start bold or underlined text. Finally, you check the disc catalogue and load the appropriate header file or document that you want to edit. You may already have automated part of this process by using an exec file or !BOOT file to define the function keys.

The idea of using a header file is to have the outline or the start of a document on disc. Usually, you want all of your business letters to look the same, with a standard page layout to suit your stationery, and perhaps your address in a letterhead. All the *Wordwise* commands to define the layout and the letterhead could be put into a header file. You can then start typing a new letter by loading the header, and this gives you a ready made page layout. You can have several headers for different sorts of documents – one file could be a letter outline, another could be for memos, a third just blank. The outline

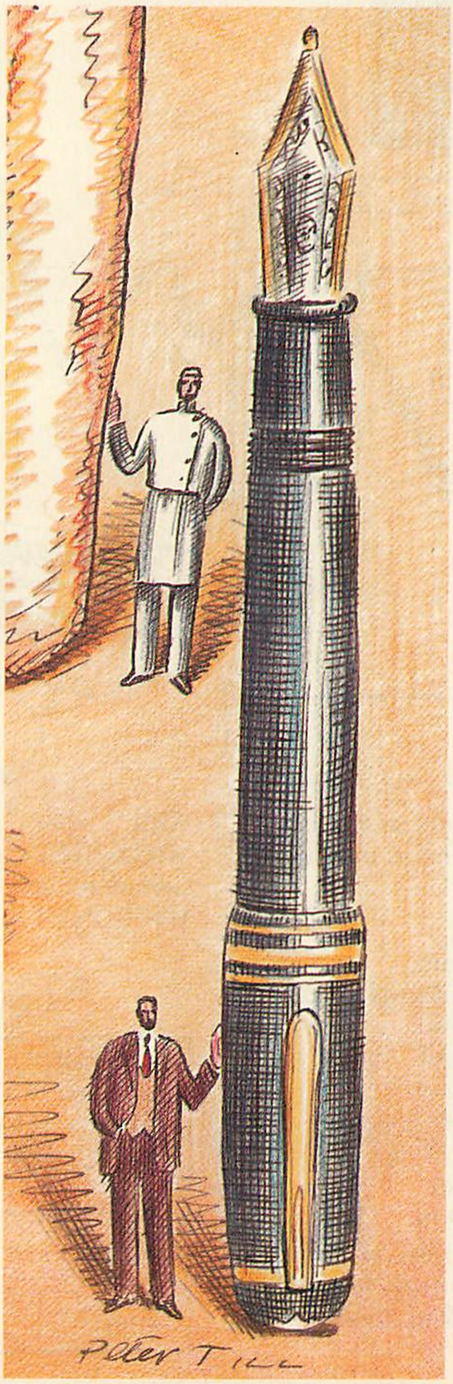


ILLUSTRATION BY PETER TILL

can define all the page, margin and indent sizes that you put at the top of almost every *Wordwise Plus* document, and by putting them in a standard file you can ensure that all your letters look equally business-like. An example header file for a business letter is shown in figure 1.

An exec file is a file containing a series of commands that you would otherwise type in yourself. The commands in an exec file are simply ordinary text, and the file can be written or edited using a wordprocessor like *Wordwise Plus*, or by using the *BUILD command.

What an exec file does is to do the typing for you, and it does it faster and more accurately too. The most common application of an exec file is as a !BOOT file. The !BOOT file gets things going by pressing Shift-Break – the file is read in, and the commands it contains are treated just as if you had typed them by hand.

Exec files are capable of skipping between languages, doing things here and there, just as you can by typing at the keyboard. And they can even call other exec files into action.

The main limitation is that because the exec file is fixed, you can't decide that you want something slightly different today. An exec file can't be used to set up *Wordwise* and then load in one of six files chosen from a menu: there is no way to make the choice between menu items.

Listing 1 on the yellow pages is a program that lets you choose options from a menu. The option is stored in memory. When the exec file is used, the menu program tells the exec file where to look for the name of the chosen option. This way, the option chosen can be different every time, and the exec file can always find out which header file is needed. All

you have to do is boot the disc using Shift-Break, then choose your standard file from the menu. The procedure that the computer goes through is as follows:

- After Shift-Break the menu program is entered. This display the options and waits for further instructions
- It stores the number of the chosen option or places the name of the file into a known location in memory
- The first exec file is called, and defines the function keys. In turn, this calls a second exec file
- The second exec file finds the name of the option in memory, starts up *Wordwise Plus*, and then loads in the appropriate standard file

The menu routine is a Basic program. Type in listing 1 and save it – it's best to call this something like B.WWMENU. When run, it displays the list of standard headers that you have come to use, plus a no file option if you wish. You can also type in star commands, just as under the *Wordwise* menu, to change drives or directories. Lastly, the menu can call the exec files into action. This is where all the real work is done, as described above.

A selection of exec files can be used, one after the other, though only two are shown here. The first sequence, shown in figure 2, consists purely of *KEY commands to set up the function key strings. This file must be called E.WWFKEYS. The last statement in this file is a *EXEC command to call its companion into operation.

The second exec file in figure 3, called E.WWENTRY, is the one that automatically calls up *Wordwise Plus*, and loads in the appropriate header file. Note that at the end of E.WWENTRY there is a single blank line. It uses *Wordwise Plus* colon commands to load in whatever files it needs from the disc.

The exec file is passed parameters via the resident integer variables, A% and B%. Fortunately, these are the same in both Basic and *Wordwise Plus*, so if A% is set by the Basic menu program, it can be used later by *Wordwise Plus*. A% holds the option number from the menu, which controls which of the standard header files should be loaded. B% holds the address of a filename string stored in memory by the menu program. This is used when you wish to edit an existing document; press menu option 8, then type in the filename. At present, this filename is stored at memory address &0380. This is usually a fairly safe area of memory because it is used by the cassette filing system. You can change

```
<f1>*FX6
<f1>ES77
<f1>PL70
<f1>LL65
<f1>LNS
<f1>EP
<f1>EM
<f1>TS3
<f1>HP1
<f1>BS3
<f1>DF

<f1>DH<f1>FI<f2>Page <f1>PP<f2>
<f1>FI<f2>C. F. & D. TRINHAM.
<f1>FI<f2>Registered Builders

<f1>FI<f2>271 St Helena Road,
<f1>FI<f2>Greenborough.
<f1>FI<f2>Tel. Greenborough 2879

<f1>FI<f2>2nd September 1987
```

Figure 1. Example header file

PROCEDURES AND FUNCTIONS	
PROCinitialise	Set up routine
FNmenu	Get menu option
FNoptions	Show menu
PROCshow	Flash menu choice
FNfile	Get filename
PROCosci	Star command
PROCcursor	Flashing cursor control
FNget	Get single character
FNinput	Get string
PROCsyserror	Errors in PROCosci
PROCoserror	Other errors

MAIN CONSTANTS	
oscommand%	Oscli buffer
oscli%	Oscli call address
up%	ASCII code 11
return%	ASCII code 13
escape%	ASCII code 27
star%	ASCII code 42
delete%	ASCII code 127
yellow$	Teletext code 131
cyan$	Teletext code 134
flash$	Teletext code 136
crkey%	INKEY code -74
esckey%	INKEY code -113
off	Set to zero
on	Set to one

EXPORT VARIABLES	
A%	Menu selection
B%	Address of filename

```
*| function key definitions
*| for Epson FX printer
*|
*| Underline on and off
*KEY 0 |!|0C27,45,1|!"
*KEY 1 |!|0C27,45,0|!"
*| Bold on and off
*KEY 2 |!|0C27,69|!"
*KEY 3 |!|0C27,70|!"
*| italics on and off
*KEY 4 |!|0C27,52|!"
*KEY 5 |!|0C27,53|!"
*| superscript
*KEY 6 |!|0C27,83,0|!"
*| subscript
*KEY 7 |!|0C27,83,1|!"
*| normal
*KEY 8 |!|0C27,84|!"
*KEY 9
*|
*EXEC E.WWENTER
```

Figure 2. Setting up function keys

this easily by altering the menu program – no change is necessary to the exec files. But reading the filename in *Wordwise Plus* programming language is difficult. As the filename string is stored in Basic using the equivalent of:

```
$&380 = files$
```

the obvious way to read it is to use:

```
file$ = $&380
```

Wordwise Plus doesn't use the $ indirection operation like this to read a string from memory, so the filename has to be built up character by character, like this:

```
:F$=""
:F$=F$+CHR$(?(B%+0))
:F$=F$+CHR$(?(B%+1))
```

A maximum of 12 characters are allowed for in the E.WWENTRY exec file, enough for the DFS. If you have ADFS, then you may want to extend this, to allow you to use longer directory names.

The other file used is one of the many *Wordwise Plus* utilities – in this case one called W.WWUTILS – and it gets loaded into *Wordwise* segment 0. If you have more than one of these utilities, perhaps for mailmerging or label printing, then they can be loaded into other segments in a similar fashion.

These two separate exec sequences could be combined into a single exec file, but they have been separated so that the key definitions can be edited without the risk of ruining the main sequence contained in the second file. It also demonstrates that the parameters placed in memory are not destroyed or altered by the action of the first exec file.

Now for the !BOOT file to get the whole thing going automatically. To get this onto the disc, type the following command:

```
*BUILD :0.$.!BOOT
```


BBC
Master
Series

A series of line numbers are given; type in the commands necessary to start up the Basic menu program:

```
*BASIC
CHAIN ":O.B.WWMENU"
Escape
```

Pressing Escape finishes creating the file, and stores it on the disc. To complete the process, type:

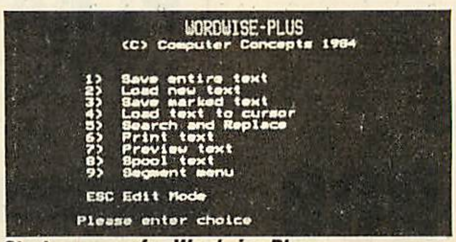
```
*OPT 4,3
```

This makes sure that the !BOOT file is enabled: *OPT 4,0 disables it. You should at this stage have at least four files on your disc – the Basic program, two exec files and the !BOOT file.

You might also have some of the standard header files like that shown in figure 1 – obviously the filenames used in the menu program and in the exec files should be altered to match the ones that you use. A second such standard header, suitable for a report or article, is shown in figure 4. This defines the page layout and defines some printer control codes. The menu system is aimed at allowing you to chose which of a number of such headers you want to start off with.

Using this program you should be able to produce a customised menu to suit the utilities that you need. It should cut out a lot of the typing of setting-up commands that you have to go through every time you switch the computer on, before you can get down to work. The program should make the otherwise excellent *Wordwise Plus* considerably easier to use.

For details of Philip Trinham's menu listing please refer to the yellow pages index on page 113. They are also included on the monthly listings disc (see page 133).



Start up menu for *Wordwise Plus*

```
*| Entry to Wordwise Plus
*| by Philip Trinham
*| for BBC B/B+/M/C
*| (C)Acorn User Nov 1987
*|
*WORDWISE
:F$=""
:F$=F$+CHR$(?(B%+0))
:F$=F$+CHR$(?(B%+1))
:F$=F$+CHR$(?(B%+2))
:F$=F$+CHR$(?(B%+3))
:F$=F$+CHR$(?(B%+4))
:F$=F$+CHR$(?(B%+5))
:F$=F$+CHR$(?(B%+6))
:F$=F$+CHR$(?(B%+7))
:F$=F$+CHR$(?(B%+8))
:F$=F$+CHR$(?(B%+9))
:F$=F$+CHR$(?(B%+10))
:F$=F$+CHR$(?(B%+11))
:SELECT SEGMENT 0
:LOAD TEXT "P.WWUTILS"
:SELECT TEXT
:IF A%=1 THEN LOAD TEXT ":O.W.BUSLET"
:IF A%=2 THEN LOAD TEXT ":O.W.BUSLET+"
:IF A%=3 THEN LOAD TEXT ":O.W.STDLET"
:IF A%=4 THEN LOAD TEXT ":O.W.MEMO"
:IF A%=5 THEN LOAD TEXT ":O.W.AUART"
:IF A%=8 THEN LOAD TEXT F$
:F$=""
:IF A%<8 THEN CURSOR BOTTOM
:PRINT CHR$(6)
```

Figure 3. Calls *Wordwise Plus*

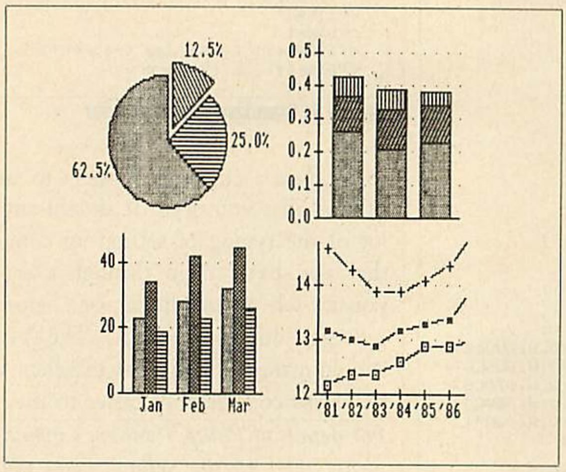
```
<f1>ES76,32
<f1>ES50
<f1>RPS0,27,95
<f1>RPS1,27,82
<f1>RPS2
<f1>RPS3
<f1>RPS4
<f1>RPS5,27,78
<f1>RPS6,27,1,1,230,0,32
<f1>RPS7,27,1,1,230,0,48
<f1>RPS8,27,1,4,230,0,32
<f1>RPS9,27,1,4,230,0,48
<f1>PL66
<f1>LL50
<f1>LS2
<f1>EP
<f1>EM
<f1>LNS
<f1>PC"("
<f1>TS3
<f1>HP1
<f1>DH<f1>CE<f2>Page <f1>PP<f2>
<f1>DF<f1>CE<f2>more...
```

Figure 4. Standard report header

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THE RECURSION VERSION

Recursion is an alternative method to repetition and looping. The quicksort is just one application for it

Nick Wetherby

Computers are good at doing things repetitively, so much programming is about controlling repetition. BBC Basic has the FOR. . .NEXT and REPEAT. . .UNTIL structures to help you in this. Recursion is a programming technique that strikes terror into even experienced programmers, yet it is not really very different from these other two structures. Some computer languages, like Lisp, are built so strongly around the recursion concept that it almost replaces the other types of repetition.

Recursion is usually seen when a procedure or function refers to itself. So half way through doing a procedure, say, the computer goes back to the beginning of the procedure. And half way through the second time, it goes back to the beginning again. . . This illustrates a fundamental point about recursion – it must be controlled, otherwise it becomes the equivalent of an infinite loop.

One way to view the difference between repetition and recursion is that repetition is about building up the solution from something very small. Printing 10 dots is the same as printing one dot, but doing it 10 times. In contrast, recursion means breaking down the solution into something smaller and easier. Printing 10 dots is the same as printing one dot, then printing nine dots. And printing nine dots can be done in the same way, by printing a dot then eight dots.

What happens when we get to one dot? This is the same as printing a dot then no dots. But printing no dots can't be done recursively. So although recursion breaks down a problem into smaller and smaller parts, the very smallest part must not be solved recursively. This places a limit on how much recursion occurs, and prevents it becoming an infinite loop. In general, there must always be two elements to a recursive procedure – the part that solves the complex bits by breaking them down recursively, and the part that solves the simple bits without recursion.

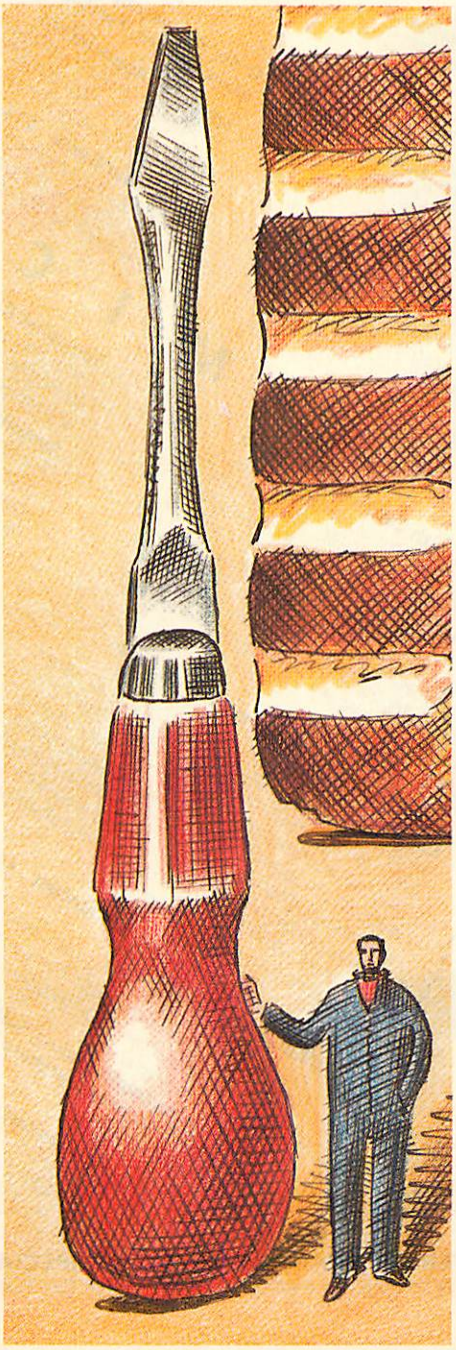


ILLUSTRATION BY PETER TILL

There is a function in mathematics called factorial – the factorial of, say, five is 1*2*3*4*5, and it's often written as 5!. The first listing in box 1 defines a function using a FOR. . .NEXT loop to work out the factorial of a number. Type in the program, then use the function by entering this:

```
PRINT FNfactorial(5)
```

This program first sets j% to one, then uses a loop to multiply it by two, by three and so on, up to five. Experiment with other numbers too. You'll find that the number doesn't have to be very big for its factorial to be huge.

The other way of looking at the factorial function is to notice that 4! is 1*2*3*4. So 5! is 4!*5. This is the basis of the second, recursive, factorial function in box 2. Line 30 of this definition simply says that the factorial of a number is the number multiplied by the factorial of the next lower number. But the important bit is line 20. This controls the recursion, to ensure it doesn't become an infinite loop; it says, in effect, that the factorial of one is one.

These two programs show that recursion works, and in some cases it can even look simpler than repetition. The listing in box 3 is a recursive procedure that shows how any recursive program works. Type in the procedure, then type:

```
PROClevel(5)
```

The procedure prints the number five, then

calls PROClevel again, this time using the number four. But the first PROClevel is left unfinished. The number four is printed, and PROClevel called again. The program continues to go down to a lower level, until it reaches level zero. In PROClevel(0), it doesn't call PROClevel(−1), but continues on to print the number zero a second time. Then the procedure finishes – but the program goes back up a level, and continues with the level one procedure it left unfinished earlier. Again, when this ends, it climbs back up through the levels until it finally finishes level five. Each different level can in many ways be thought of as a completely different copy of the PROClevel program. Whatever happens at the lower levels doesn't really affect the higher levels at all.

This shows that useful work can be done both on the way down through the levels of a recursive program, or later, on the way back up. The most complex programs can even do both.

So far the only variables we've used in these recursive procedures have been passed as parameters – given to the procedure in brackets. These parameters are special, but ordinary variables work slightly differently. Add these two lines to the listing in box 3:

```
15 a%=RND(100)
45 PRINT TAB(20); a%
```

Again, call the procedure by typing 'PROClevel(5)'. As before, you will see the program going down through five levels of PROClevel, then climbing back up to the top again. As it climbs down, the variable a% is set to a random number, and as it climbs up, the random number is printed. Yet all the numbers are the same. This is because although the program uses a new copy of the procedure each time, it doesn't automatically use a new copy of all the variables. It is the same a% that is used each time, so as the recursion climbs back up, the same random number is printed out. In fact, it is the number chosen last, at the very lowest level of the recursion.

Other languages like Pascal automatically use a new copy of all the variables in a recursive procedure. Basic has to be told to do so. Comal, the Pascal-like language widely used in schools in Scotland and in Europe lies somewhere in the middle. By defining a procedure as CLOSED, it means that all the variables in it are new copies, and also that they disappear when the procedure ends. In BBC Basic, a new copy of the variable a% can be created by adding the following line to PROClevel:

```
12 LOCAL a%
```

The idea is that the new copy of a% is solely for the use of this copy of the procedure. Each level has its own a%. So typing PROClevel(5) again will now display all the different random numbers. At, say, level three, the level three copy of a% holds the random number, and it isn't affected by level two. The level three a% is hidden from all the lower levels. When the recursion climbs back up to level three, the level three a% is revealed again, and can be printed out in the normal way. Local variables have to be used like this to preserve them from the effects of lower levels of a recursive procedure.

The space needed to store all these local copies is the major disadvantage of all recursive techniques – they require more memory than ordinary repetition. If this is such a problem, then why use recursion? There are some problems ideally suited to recursive methods, where the recursive solution is much simpler to understand than a more conventional program. Fast sorting of lists using the quicksort method is one of these applications.

TABLE 1. COMPARISON OF SORT SPEEDS

Sort	Sort time (s) 100 items	10 items
Bubble	204.3	2.8
Shell-Metzner	53.1	1.8
Exchange	21.5	0.8

```
10 DEF FNfactorial(n%)
20 j%=1
30 FOR loop%=2 TO n%
40 j%=j%*loop%
50 NEXT
60 =j%
```

Box 1. Factorial program using repetition

```
10 DEF FNfactorial(n%)
20 IF n%=1 THEN =1
30 =n%*FNfactorial(n%-1)
```

Box 2. Factorial program using recursion

```
10 DEF PROClevel(n%)
20 PRINT SPC(n%); n%
30 IF n%>0 THEN PROClevel(n%-1)
40 PRINT SPC(n%); n%
50 ENDPROC
```

Box 3. Procedure to illustrate resursion

The basis of all the fastest sorting methods is that it takes less time to sort a short list than a long list. That is obvious, but there is more to it. Halve the length of the list and you more than halve the time. Two short lists can be sorted in less than the time taken to sort one list double the length. Take a look at Joe Telford's results from last month. Table 1 shows the time taken by each of the three different methods of sorting Joe described, bubble sorting, exchange sorting and Shell-Metzner sorting. The exchange sort is also known as an insertion or selection sort. You might have different times depending which computer you have – the times in the table come from a second processor. There are times for two different sized lists, of 10 and 100 items.

With all the sorting techniques, dividing the length of the list by 10 makes an even greater difference to the number of swaps and the time taken. For random lists, this is true whatever method you use to sort them.

The fact that small lists can be sorted more quickly led to the development of the Shell-Metzner technique. Donald Shell, its inventor, also knew that the bubble sort, though very slow for long lists, works reasonably well for short lists, particularly if the list is already almost in the correct order. So the Shell sort works by splitting a long list into lots of small lists, then bubble sorting each of these separately. The short lists are then rejoined, and because each is already in order, final bubble sorting works much faster.

Quicksort

The quicksort uses the same idea. Starting with a long list, it takes the first item and calls this the key. It then scans through the list; all the items higher than the key are put to one side, all the lower ones on the other. When the whole list has been scanned, the key is in its correct place – between the higher and lower items. Usually, the key value is somewhere in the middle of the list. So scanning through the list just once gives you one item properly sorted, plus two separate lists. Of course, the two lists are on average nearly half the size of the original list, so they can now be sorted much quicker. Now, which method should be used to sort the two short lists? Why not just use quicksort again? This gives you four even shorter lists, which can all be sorted using the quicksort technique. So quicksorting is a natural application for recursion. The recursion stops, of course, as soon as the lists get so small they have only one item.

Listing 1 on the yellow pages shows how

a list of random numbers can be quicksorted. PROCchooselist first selects a list of random numbers; this list is printed by PROCprintlist. Then the list is sorted, and printed out again, together with the time taken to perform the sort. The length% variable can be used to experiment with different lengths of list, for example by typing the following:

```
60 length%=50
```

PROCquicksort does the sorting work. It divides the list into two, using two pointers lo% and hi%. These start at opposite ends of the list, and are moved alternately towards the middle; one is moved while the other points to the key item. When a swap occurs, the other pointer is moved. When they meet, everything above hi% is higher, and both hi% and lo% point to the key item. The two little lists can be sorted in the same way, using recursion. Notice that hi% and lo% need to be local variables, so they can be preserved while the recursion happens.

Comparison

To compare the quicksort with some of the other methods, listing 2 on the yellow pages is a version that can be used in the same way as the programs from Joe's Jottings last month. Type in listing 2 and save it. Now you need to add Joe's listing 2. Load in his listing, then type:

```
RENUMBER 1000
*SPOOL MERGE
LIST
*SPOOL
```

This puts a text version of his program on disc (or tape), in a file called 'MERGE'. Now reload the quicksort program, and type this:

```
*EXEC MERGE
```

This adds the two programs together, and they can be saved or run. You can try to compare the times taken by the different sorting methods used last month with the quicksort. The quicksort entry in table 1 is 22.9 seconds for 100 items, and 1.15 seconds for 10 items, only slightly slower than the exchange sort.

It is more instructive to compare the sorts according to how many comparisons and how many swaps are made, since this is what takes up much of the time. Table 2 shows the results for the four methods, and reveals why they vary so much in speed. The bubble sort is the slowest, because it makes a large number of comparisons, and a large number of swaps. The Shell sort is quicker because it makes fewer comparisons and fewer swaps.

The speed rating is more confusing with the exchange sort and quicksort. Notice that the quicksort makes many fewer comparisons, but more swaps. In this case, swaps take much longer than comparisons, and so the exchange sort comes out best overall. But this needn't always be the case. If comparisons took longer, or if swaps were quicker, then the quicksort would really be quickest, and the Shell sort would be speedier that the exchange method. Exchange sorts are best when swaps take much longer than comparisons, because exchange sorts minimise the number of swaps that need to be made. The time taken to do swaps depends on what type of data you are sorting.

Judging from this, there is clearly no one best sorting method. The best there is depends on the number of items there are to sort, and the relative speed of comparing items and swapping items.

TABLE 2. COMPARISION OF SORT OPERATION

Sort	Number of comparisons 100 items	Number of comparisons 10 items	Number of swaps 100 items	Number of swaps 10 items
Bubble	4819	55	2106	29
Shell-Metzner	2444	68	452	15
Quicksort	760	31	218	11
Exchange	4950	45	92	7

The final complication is that the speed of sorting depends on the order that the data is in to start with. If the list is already in the correct order, then the bubble sort turns out to be the quickest method, and the quicksort one of the slowest. In fact, the quicksort slows down if the data is sorted in any way! This can be shown by making a small change to PROCchooselist in listing 1:

```
190 list%(A%)=A%
```

This way, the list starts off already in order. Running the program shows that the sorting takes longer than when the list was random. It happens because the key value chosen is always the first in the sorted list. So instead of breaking the list into two much smaller ones, you are left with just one almost as large. This can be cured by selecting the key at random, rather than just taking the first in the list. Adding the following line speeds up the quicksort even more:

```
345 PROCswap(lo%,lo%-1+RND(hi%+1-lo%))
```

With this addition, the quicksort is equally good at sorting lists that are already in order and lists in random order.

One further speed increase can be gained by sorting the shorter lists with an exchange sort rather than calling the quicksort again – because the exchange technique is best at short lists. To see how this works add the extra lines in box 4 and re-run the program.

Calling process

The reasons for this increase in speed are twofold: first the elements in the list between 'bot%' and 'top%' are very nearly sorted already, and as previously mentioned quicksort isn't all that quick at sorting data that's already in order. Second, procedure calling in BBC Basic is quite slow, so when the quicksort gets down to the lowest level, it takes a long time simply calling itself! So the idea is to call the exchange sort when the sub-list gets small enough. The number 20 in line 305 controls how short the sub-list must be before the exchange sort is called. Try varying it to come up with the best time. Lower values will only knock a couple of hundredths off the time because of the extra work needed, creating those local variables for example, in procedure calling. However, larger numbers will slow it down, as the actual quicksort routine is hardly ever used!

```
305 IF top%-bot% < 20
PROCexchangesort(bot%,to
p%):ENDPROC
480 :
490 DEF PROCexchangeso
rt(bot%,top%)
500 FOR I%=bot% TO top
%-1
510 L%=I%
520 FOR J%=I%+1 TO top
%
530 IF list%(J%)<list%
(L%) L%=J%
540 NEXT J%
550 PROCswap(I%,L%)
560 NEXT I%
570 ENDPROC
```

Box 4. Speed increases for quicksort

For any particular job, the sorting routine can be 'fine tuned' for the best possible performance, using a mixture of techniques, each doing what it is best at.

Nick Wetherby's program listings appear in the yellow pages section.

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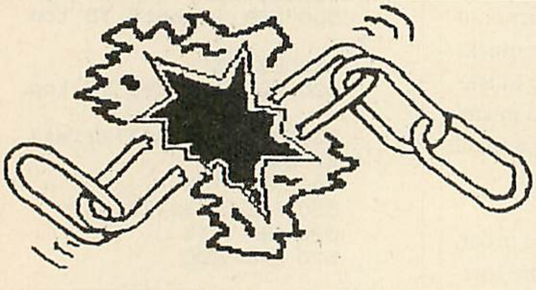
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THE BIG MACRO

You can personalise letters using macros, but long addresses can be a problem. We solve it

Graham Bell

You can use *View's* macro facilities to produce lots of 'personalised' letters, mailshots and standard documents which differ only slightly from one to another. This is doubly useful if *View* is teamed with a database such as *ViewStore*, because the parameter list for each letter can be taken from the database and inserted into the personalised letters.

All the macro parameters must fit on one line in *View*, and the line can only be 132 characters long. But what if the name, address and so on, add up to more than 132 characters? One way to overcome the limit is described here, together with a program to extract long macro parameter lists from *ViewStore* databases.

Long macros

View is incapable of accepting more than 132 characters on a line. If more are typed in then the extra characters are ignored, and the machine beeps to signal an error. If a line of greater length is loaded from a file (for example a spooled Basic program), then the text is corrupted. Conversely, if the file is loaded in by READing it, or an attempt made to over-extend a line by using CTRL-f7, then the long line is split, and the excess characters appear on the next line down.

This affects the *ViewStore* MACRO utility, which is used to extract fields of information from a database and make up a series of *View* macro calls carrying the information from the database as parameters, one macro call for each database record. These macros are useful for standard letters, the names and addresses being taken from the database. Occasionally, the database fields selected for placing in a parameter list of a macro contain more than 132 characters for one or more records of the database. If this happens, the MACRO utility splits the line, and the excess characters are placed on one or more additional lines below the macro.

The *ViewStore* manual suggests that in this event, the list of parameters for the macro should be abbreviated in *View* so as to fit on a single line. Fine if only one or two macros overflow the limit, but what if one or two hundred do? If you keep a big database containing addresses of legal partnerships, or advertising agencies it will happen all the time, because their addresses are very long.

Multi-macros

One solution to this is to split a standard letter into a series of two or more macros. For an example, see the macro definitions in figure 1. The two example macros AA and AB would, when used together, print out a letter, but each is incomplete on its own. This is a 'multi-macro'. Unlike a normal letter produced by passing parameters to a single macro definition, this multi-macro example would need two macro calls to complete it, and the two must be in the correct order. A set of calls to print one letter is also in figure 1. Of course, two macros isn't the limit; there can be several in each multi-macro.

All the parameters of a multi-macro can add up to more than 132 characters in total, providing that any one individual macro doesn't have more than this number of characters in its parameter list (so two macros with 100 characters-worth of parameters each is acceptable, but one macro with 200 is not). The other limit on macros, that there may be only 10 parameters, can also be solved this way.

For producing lots of standard 'personalised' letters it is easiest to produce a macro

USING MACROS

The way to personalise letters is to write one standard letter, but without any of the personal information, such as the address, filled in. Put parameters into the letter instead: the first parameter is @0, the second @1, and so on. So the beginning of a letter may look like this:

```
LJ @1
LJ @2
LJ @3

     25th September 1987

     Dear @0
```

When the letter is printed, the @0 gets replaced by a name, @1, @2 and @3 by the three lines of the address. To define the letter as a macro, put the edit command DM at the beginning of the letter, and EM at the end. The two-letter name of the macro goes after the DM.

To print the personalised letters, the macro must be called. This is done by putting the name of the macro in the *View* text after the EM, and supplying a list of parameters. If the macro is called AA, then the call may look like this:

```
AA Brian,Flat 3,Elm St.,Hull
```

and the eventual letter like this:

```
Flat 3
Elm St.
Hull

25th September 1987

Dear Brian
```

Clearly, it is easier to write a single letter and lots of parameter lists, than to write a new letter for each person.

file automatically from a database; these multi-macros are no exception. *ViewStore* normally uses the MACRO utility, but this can only produce a series of calls to a single macro, one call for each record in the database (or one for each record in the SELECT file). VSMACRO, listing 1 on the yellow pages, can produce a macro file containing a series of calls to a multi-macro, which can be composed of several individual named macros.

There is an important consequence of the VSMACRO method. The macro parameters produced are of fixed format; the number of characters in each field (@0, @1, @2, etc) is controlled, and the parameter is truncated or padded out with spaces as necessary (but see below if space padding is not to your taste). The standard MACRO utility produces parameters that are of variable length, so a name could be five or 50 characters long – with VSMACRO the length will always be the same.

How to use VSMACRO

Type in the Basic program in listing 1, save it using a name like 'MACROSC', then run it. The Basic program should assemble and save the machine code file 'VSMACRO'. If you are using ADFS, then the sub-directory 'V.' must be created first.

There are two steps in producing a file full of multi-macro calls from your database using VSMACRO. First, in *ViewStore*, a report definition is set up to describe the fields that should be taken from the database and put into the macros. The report definition has a special layout that is described below. Then, in *ViewStore* command mode, the VSMACRO program and the database are loaded, the REPORT utility is used to 'print' a report. VSMACRO creates the macro file from the report.

The macro file can be combined with the multi-macro definition in *View*, to print a whole set of 'personalised' letters – a process often known as mailmerging.

The first operation is to create a blank report definition file, using the SETUP utility in the normal way. Now you can enter the information that defines which fields to take from the database to use in the macro to load the new blank definition file called, say, 'ADDRS'

```
LOAD R.ADDRS REPORT
```

Now switch to the data screen, by pressing Escape, to see the blank definition file. You must enter one line of data for each macro you plan to use, so that means two or more lines for a multi-macro. Obviously, the macros in the report definition should be in the order they are required in the multi-macro. There are three types of information to be entered for each macro: type, format line and field list.

```
the definitions of the AA and AB macros:

DM   AA
RJ   Ball & Co. Lighting Services
RJ   14 Railway Cuttings
RJ   Derby, DE1 9QQ
RJ   @0
LJ   @1
LJ   @2
LJ   @3
EM
DM   AB

     @0

CE   New Improved Specification

     We wish to bring to your attention our new
     "Executive" range  of  wall-mounted  lamps
     light fittings...

     Yours @1,
     Edwin Ball
PE
EM


an example call to AA and AB:

AA   30.8.86,17 Whin Terrace,Thornthwaite,Durham
AB   Attn: Joseph Addyman,sincerely
```

Figure 1. *View* multi-macro definition and example call

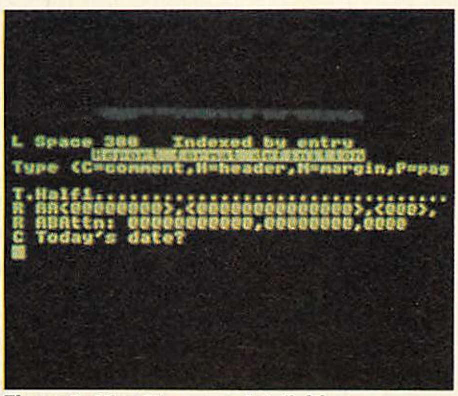


Figure 2. *ViewStore* report definition

Type must be R for every macro. There must be no other line types except comments – no header lines, sub-totals or totals.

The format line (placed in the fields called Half1 and Half2 as normal) must start with a two-letter name for the macro, as used in the macro definitions. For example, the names used in figure 1 were AA and AB. The name must be different for each macro and must not clash with normal *View* edit commands like PL or LS. Immediately after the macro name, the patterns or formats may be listed. These are the @@@@ parts of any normal report. Each format will be replaced by information from the database when the macro file is created. Separate the formats with commas, not spaces. If the format might be replaced by information that could include a comma, surround the format by angle brackets. These characters are necessary so *View* can interpret the macro parameters correctly. Finally, put an extra four characters format at the end. So a complete format line looks like this:

```
AC@@@@@,@b.b,<@@@@@@>,@@@@
```

Here, the macro AC has four parameters; the second is a number with one decimal place, the third may include a comma. If the information from the database is too short for the format (a six-letter surname in a 15-letter field, for example), then the parameter will be padded with spaces. If the information is too long, then it is truncated.

Just as with a normal report, the field list must contain one item for each format in Half1 and Half2. The item may be a field name (the name of a field in the database), an arithmetic expression or a comment. Register operations may also be included, but they don't need a corresponding format in the format line. The item for the extra last format should be '¦R'.

A complete example to define a multi-macro for the standard letter in figure 1 is

given in figure 2. Notice how a comment is used to add the appropriate date to the letter. The 'Attn.' before the name field is added to the macro parameter, rather than being extracted from the database.

When you have set up the report definition file, press Escape to return to *ViewStore* command mode.

Spooling multi-macro calls

VSMACRO is a custom printer driver. From *ViewStore* command mode, it is loaded using the command:

```
PRINTER VSMACRO
```

This printer driver should only be used to 'print' specially formatted reports as above.

The database from which information is to be taken must also be loaded. Then type:

```
UTILITY REPORT
```

to start the REPORT utility, and answer the questions as shown in figure 3.

```
Use select file (N,Y)? Y               or N if you want one
                                       letter for every
                                       record in the database

Screen or printer (S,P)? P             or S for just a quick
                                       preview of the macros

Use report format file (N,Y)? Y

Report filename? <report file>         enter the name of the
                                       special report defin-
                                       ition file

Send totals to linking file (N,Y)? N

Subtotal field? <RETURN>               no subtotals required

Single sheets (N,Y)? N

                                       the machine prompts
                                       for answers to any
                                       comment lines here

Macro filename? <macro file>           enter the name of the
                                       macro file
```

Figure 3. Using *ViewStore's* REPORT utility to create a multi-macro file

The information is then extracted from the database by the REPORT utility, and the macro calls are put into a file. One macro or multi-macro call is produced for every record in the database, or one for every record in the SELECT file if the SELECT option was chosen. A completed multi-macro file loaded into *View* is shown in figure 4.

If an error occurs while this process continues, or Escape is pressed, then the files are closed and the program returns to *ViewStore* command mode.

The macro file can then be loaded into *View* for checking, or merged with the letter file – the file containing the text of the standard letter. The easiest way to print the set of letters is to enter *View* and type:

```
NEW
PRINTER FX80
```

to load the driver for your printer, then

```
PRINT LETTFIL MACRFIL
```

will print the set of personalised letters. Your own filenames should be used instead of LETTFIL and MACRFIL.

The letter file contains only the definitions of the multi-macro making up the standard letter – the macro file contains just the macro calls, with parameters extracted from *ViewStore*.

Advanced use of VSMACRO

The padding spaces left at the end of the macro parameters can be removed if you don't like them. Load the macro file into *View* and type:

```
CHANGE/ ,/,/
CHANGE/ >,/>,/
```

then resave the file. The excess spaces are recognised by the fact that they precede a



Figure 4. Multi-macro file in *View*

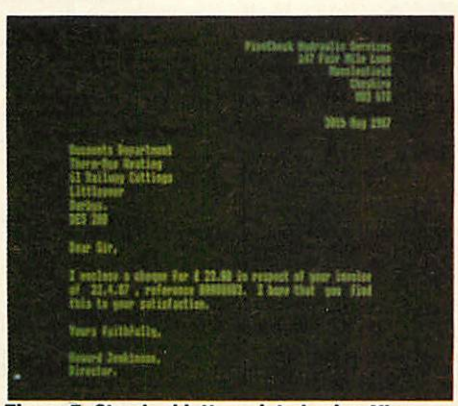


Figure 5. Standard letter printed using *View*

comma, and are deleted. Neither the ordinary spaces adjacent to commas, nor the leading spaces appearing before numbers, are removed as these spaces occur in their usual place, after a comma. This is exactly what is required to keep everything neat.

The real function of the extra ¦R field at the end of the *ViewStore* field list is to ensure this stripping works properly on all current versions of *View*. A comma and any single character would do, but using ¦R has the side effect of serial numbering all the multi-macros (up to 9999). The number isn't printed in the letter and has no effect on the macros. If you do want to number the letters, then you can use this extra field – if a *View* macro definition normally has four parameters, @0 to @3, then @4 is the serial number.

This method offers one more facility: the ability to join two or more pieces of information together, to produce a single macro parameter. The standard MACRO utility insists that one database field equals one macro parameter. But consider this format line:

```
AD<@@, @@@@@@@@@@@@@@@@>,@@@@
```

The macro AD has only one parameter, discounting the extra one at the end of ¦R, because *View* will treat the two formats enclosed by angle brackets as one single parameter. But the formats will be replaced by data from two database fields. So you could join, say, a job title field and a company name field. The macro call might eventually be:

```
AD <MD, Zinc Coating Ltd>,    1
```

The space and the comma after 'Sales executive' are derived explicitly from the format line, like the 'Attn.' in the figure 2. example. If you joined parameters like this, then it will almost certainly be necessary to remove the padding spaces from the fields, to keep the parameters neat.

PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

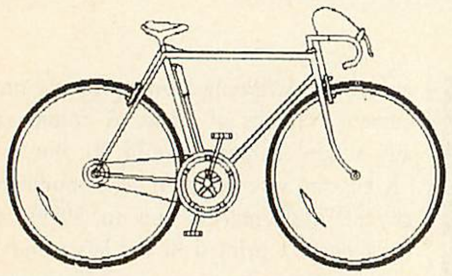
The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

SUMMARY of DIAGRAM II FEATURES

1. Works on any model BBC computer with either DFS or ADFS.(ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.



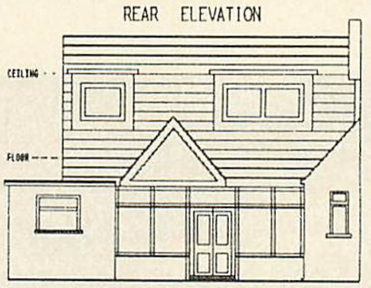


Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.

DIAGRAM II — £55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board draughting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

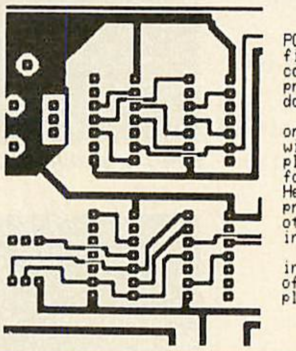
The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £85.00 + vat



PCB PLOTTER DRIVER

A new addition to the PCB software is the PCB plotter driver program. This enables files produced by PCB to be used in conjunction with most types of plotter to produce plotted output rather than the normal dot-matrix printer output.

In this way plots may be produced directly onto film or even directly onto copper board with an etch resistant pen if a suitable plotter is available. The program is suitable for use with most makes of plotter including Hewlett Packard, Hitachi and Plotmate M. The program can also be configured to work with other plotters by entering suitable plotter instructions.

All the features of the printer driver are included, such as the automatic thinning down of tracks between roundels. Mirror image plots are also available.

PRICE £35.00 + vat

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	£ 60.00 + vat
For Master 128 (with Pointer Rom)	£ 60.00 + vat
Bare Trackerball (no software)	£ 49.00 + vat
Pointer Rom - available separately	£ 12.50 + vat
Trackerball to mouse adapters	£ 8.00 + vat
Postage & packing on Trackerballs	£ 1.75

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £119.00 + vat

ADFS Utilities Rom — ADU

ADU is an invaluable utility for all ADFS users. It adds over 20 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

Additional *commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT.

PRICE £29.00 + vat

All orders sent by return

VISA

39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL Tel 01-599 1476

Access

SPELL-MASTER

This is the first completely ROM based spelling checker in the world. As a result it out-performs all known spelling checkers on this machine or any other micro-computer. The single 128K EPROM contains over 59,000 separate words and 22K of program.

Compatible with all BBC Micros

Special switching techniques ensure that the 128K ROM appears to the machine as one single 16K ROM - this guarantees that it is completely compatible with the ROM sockets in all versions of the BBC Micro- computer.

Compatible with all the major word processors

SPELL-MASTER has been designed to fully integrate with the most popular word processors on the BBC, WORDWISE and WORDWISE PLUS, VIEW and of course INTER-WORD. While editing in these word processors all that is necessary to control SPELL-MASTER is to press one CTRL key (Usually CTRL-J). This causes a menu to appear listing a variety of options such as 'Check entire text', 'Check word at cursor', 'Continuous check - on/off etc. Text is checked directly in memory while in the word processor. There are even short-cuts to the menu, for example, pressing CTRL-V in any of the above word processors will start checking the text immediately from the current cursor position. Compare this with the process of checking text in the most highly rated competitive product - VIEWSPELL.

VIEWSPELL	SPELL-MASTER
•Save text from word processor. •Enter spelling checker. •Load text into spelling checker. •Check the text. •Go back to word processor. •Load marked text. •...finally, make corrections.	•Press CTRL-V • make corrections.

Check entire text

In a word processor, SPELL-MASTER can check at up to 10,000 words per minute. Whenever a word is indicated as misspelt the user is given three simple choices. Replace the word with another selected from the dictionary, ignore the word altogether or add it to a user dictionary.

Check as you type

Because the dictionary is ROM based it is possible to check words as they are typed. This feature works with all the above named word processors and does not slow the operation of the word processor at all. Whenever an incorrect word is entered the computer will bleep; the word may then be corrected or simply ignored.

User Dictionaries

SPELL-MASTER supports extensions to the main dictionary in sideways RAM or ROM. This has the advantage that there is no speed degradation when checking against user dictionaries, since there are no disc accesses required at all. Once a word is added to a user dictionary it is treated as if it is present in the main dictionary.

SPELL-MASTER can support a number of separate dictionaries at once, each sideways RAM or ROM holding up to 3000 additional words. Once a dictionary has been created it can be 'burned' into an EPROM to form a permanent extension to the main dictionary.

Provision is made for editing any dictionary extension, for adding or deleting words in bulk, and directly loading or saving user dictionaries from or to sideways RAM.

Additional star commands

These can be issued from any language ROM such as spreadsheets or BASIC (they can even be included into BASIC programs). Some of the 8 commands are:

*CROSSWORD - Will search the entire dictionary for words that exactly fit the search pattern. For example *CROSS. ##M#U#ER would list ARMOURER, COMMUTER, COMPUTER. It takes about 8 seconds to check against all 59,000 words.

*ANAGRAM - Will list all the words in the dictionary that contain the same letters as those specified.

*FUZZY - Will list all words that sound something like the one you are searching for. If you are not sure of the spelling of a word then entering the approximate spelling here will generally list the word you are looking for.

Price: £59.00 incl.

Upgrades

Owners of the older two chip versions of SPELL-MASTER can upgrade to the single chip version for £25.00. However this new version is functionally equivalent and so it should not be necessary to upgrade.

2nd processors

Due to its unique design SPELL-MASTER will not work with word processors running on the 6502 2nd processor, although there are facilities provided for checking long text files.

VISA

Computer Concepts

Access

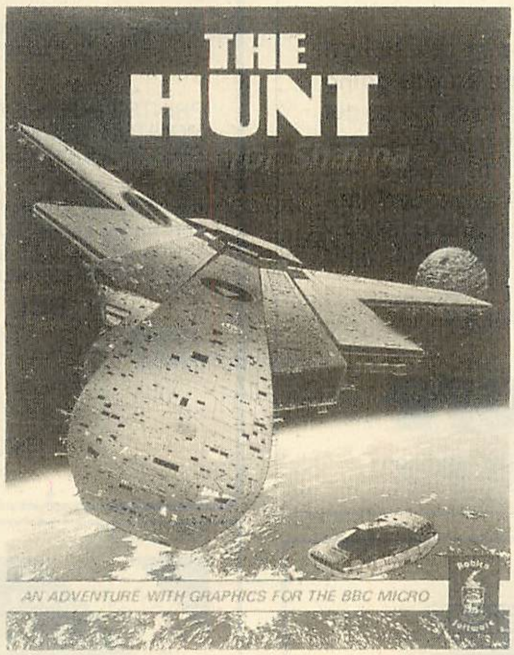
Gaddesden Place, Hemel Hempstead, Herts HP2 6EX Telephone: (0442) 63933

COMPETITION

JOIN THE HUNT

Solve this logic puzzle and gain the chance to tackle a whole lot more in Robico's *The Hunt*

Stuart Anderton



Regular *Acorn User* readers Nigel, Sarah, David, Philip and Gary visited the *Acorn User* exhibition. They each now have a different Acorn computer – an Electron, a Compact, a Master, a BBC B, and one even managed to buy an Archimedes at the show.

On emerging from the Barbican they had with them a mouse, a joystick, a trackerball and a lightpen. One of them enjoyed a great time playing with the Domesday system, and had spent her hard-earned cash on the Marconi stall. David's computer is the oldest; he bought it almost exactly five years ago! The Compact owner was tired of playing arcade games with the keyboard, and was itching to get home to try out his new purchase.

Philip's machine is the only one not to carry the BBC name. Nigel was very impressed by the RISC technology he saw at the show, and has since resolved to upgrade from his eight-bit machine as soon as possible.

Can you work out who has which computer and what input devices they have fitted? By the way, the lightpen isn't fitted to the Electron.

This month's competition is a logic problem based around the Acorn micros. The prize is the latest great adventure from Robico. We have 10 BBC B copies of *The Hunt: Search for Shauna* to give away to the winners who can work out the puzzle above, five on disc and five on cassette. State which version you would like.

It's an adventure game set in a science-fiction future, with graphics for each location. The aim is to rescue a former space shipmate Shauna from a kidnapper on a vast space station.

Put your answers to the problem on a postcard, or write them on the back of a sealed-down envelope. Send them to *Acorn User* Hunt Competition, Redwood Publishing, 20-26 Brunswick Place, London, N1 6DJ, to arrive by December 7. Don't forget to include the coupon on this page with your entry – entries can't be accepted without it – and don't forget to include your own address too. The winners will be the first correct entries pulled out of the hat on December 7 and will be notified by post. The editor's decision is final.

ACORN USER
COMPETITION
NOVEMBER









ACORN USER

- Acorn User *caters for all BBC/Acorn*
- *micro users from the*
- *learner to the advanced programmer.*

CHRISTMAS

- *Stimulating, entertaining and informative*
- *features cover everything from business*
- *and education to the home*

SUBSCRIPTION

- Acorn User *keeps you abreast of the*
- *developments that affect your BBC micro*
- *Every issue is packed with news and reviews*

OFFER

You probably don't need reminding that Christmas is just round the corner, but with the help of Acorn User *magazine Christmas shopping won't be difficult. Treat a friend, or yourself, this Christmas to a 12-month subscription to* Acorn User *magazine for only £17.50 and we will send you a free monthly listings disc or cassette.*

All you need to do to guarantee a Christmas gift that will be used and appreciated for 12 months is to fill in the coupon and choose your favourite Acorn User *monthly listings programs. We will send a free gift card to the recipient.*

Acorn User's *monthly listings discs and cassettes contain all the major programs from the 15 yellow page listings in the magazine, and some bonus ones that don't ever appear in print. The monthly listings discs and cassettes preserve your fingers, save time, avoid typing errors and best of all the programs will work first time.*

Choose your free disc from 39 discs or cassettes packed with the best programs, utilities and graphics.

Don't forget every disc or cassette contains a stunning Graphics Bonus. So do a friend a favour or treat yourself: subscribe now and receive the disc or cassette of your choice absolutely free. There are more Christmas gift ideas on pages 131-135.







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____

POSTCODE ______________________

I enclose my cheque/postal order for £17.50 made payable to Redwood Publishing Ltd.

Please debit my Access/Barclaycard

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SIGNED ______________ DATE ______________

Send this form with your remittance to Gail Fairhall, Acorn User Subscriptions, Redwood Publishing Ltd, Lambourn Woodlands, Newbury, Berks RG16 7TW.

YELLOW PAGES

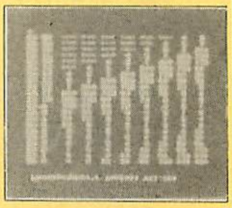
INDEX/COMPATIBILITY

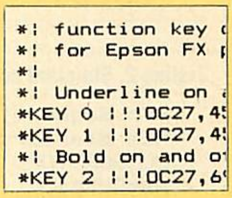
Entering listings

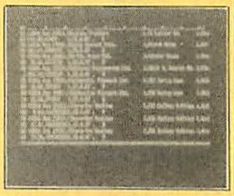
To make the task of entering listings easier, *Acorn User* has adopted several standards in the yellow pages. Programs are listed with line numbers in increments of 10, so type AUTO <Return> for automatic line numbering before you start. Before you list what you've entered, type LISTO 1 <Return> to provide spaces after the line numbers. Programs in the yellow pages are often listed to a width of 40 characters, so type MODE 6 <Return> before you start. Comparing the line-endings of your listing with the yellow pages will help you spot extra or missing characters.

To make sure that the program you want to enter *will* work on your particular machine, check the index below. All the listings work with Basic 1, 2 and 4 (unless stated otherwise) and with operating systems OS1.2 or above. If a program is accompanied by an article, please read the article first. If special care is needed when entering, we provide an easy-to-complete 'How To Enter' box.

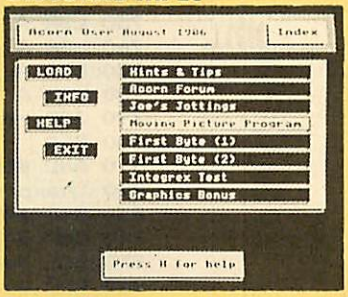
Once you've typed in your program, save it to tape or disc then test it by running it. If you have a major problem with a listing, ask someone to check it. If you still have difficulties, you can also send off for a list of *Checksums* which help you find the errors. Send a large sae (26p stamp) to *AU*Checksums, PO Box 641, London NW9 8TF.







DISCS AND TAPES



All the listings on these pages can be found on this month's listings disc or cassette. See page 129 for details of how to order.

BACK ISSUES





For help with entering and debugging listings see the following back issues: April '86, June '85, Aug '84, Sept '83.

Program	Page	BBC B	B+/128	Master 128	Master Compact	Electron	6502SP/ Turbo	ADFS	Econet	Shadow RAM	Monthly T/D
Hints & Tips	114										
Listing 1		■	■	■	■	■	■	■	■	■	■
Listing 2(A)		■	■	■			■	■	■	■	■
First Byte	114										
Listing 1-3		■	■	■	■	■	■	■	■	■	■
Acorn Forum	116										
Listing 1(A)		■	■	■	■	■	■	■	■	■	■
Listing 2&3			■(C)	■	■		■	■	■	■	■
Listing 4						■		■			■
Joe's Jottings	119										
Listing 1		■	■	■	■		■	■	■	■	■
Listing 2		■	■	■			■	■	■	■	■
Choose Your Words Wisely	125										
Listing 1(A)		■	■	■	■		■	■	■	■	■
The Recursion Version	126										
Listing 1-2		■	■	■	■	■	■	■	■	■	■
The Big Macro	127										
Listing 1		■(B)	■(B)	■		■(B)	■	■	■	■	■

Notes: (A) Requires *Wordwise Plus*. (B) Requires *View/ViewStore*. (C) Listing 2 not compatible with B+/128

See Hints & Tips, page 41

Listing 1. Daisy-wheel printer tester

```
 10 REM Hints & Tips Listing 1
 20 REM by Martin Phillips
 30 REM for B/B+/M/C/E
 40 REM (C) Acorn User Nov 1987
 50 :
 60 @%=7
 70 VDU 2,13
 80 FOR N%=33 TO 255
 90 IF N%=127 THEN N%=161:PRINT
100 PRINT N%;" "CHR$(N%);
110 IF N% MOD 8=0 THEN PRINT
120 NEXT N%
130 VDU 13,3
```

Listing 2. Standard configuration settings

```
REM Segment 4
REM Standard configuration settings
CURSOR TOP
A$=CHR$13
TYPE"|G EP |G JO |G LS2 |G LM5 |W"
TYPE A$
TYPE"|G TS3 |G DP35 |W"
TYPE A$
DISPLAY
```

See First Byte, page 47

Listing 1. Showing the parameters passed

```
  10 REM First Byte Listing 1
  20 REM by Tessie Revivis
  30 REM For B/B+/M/C/E
  40 REM (C) Acorn User November 1987
  50 :
  60 temp=&72
  70 pblk=&600
  80 osasci=&FFE3
  90 osnewl=&FFE7
 100 A$="HELLO WORLD"
 110 PROCassemble
 120 CALL &900,temp,$&A00,A$,?&70
 130 END
 140 :
 150 DEF PROCassemble
 160 FOR F%=0 TO 3 STEP 3
 170 P%=&900
 180 [OPT F%
 190 JSR txtprt
 200 OPT FNequs("There are &")
 210 LDA pblk
 220 JSR hexprt
 230 JSR txtprt
 240 OPT FNequs(" parameters")
 250 OPT FNequb(13)
 260 LDX #0
 270 LDY #0
 280 .loop
 290 CPX pblk
 300 BNE loop2
 310 RTS
 320 .loop2
 330 JSR txtprt
 340 OPT FNequs("Parameter at &")
 350 LDA pblk+2,Y
 360 JSR hexprt
 370 LDA pblk+1,Y
 380 JSR hexprt
 390 JSR txtprt
 400 OPT FNequs(" of type &")
 410 LDA pblk+3,Y
```

Continued ►

◄ First Byte listing 1 continued

```
 420 JSR hexprt
 430 JSR osnewl
 440 TYA
 450 CLC
 460 ADC #3
 470 TAY
 480 INX
 490 BNE loop
 500 :
 510 .txtprt
 520 PLA
 530 STA temp
 540 PLA
 550 STA temp+1
 560 TYA
 570 PHA
 580 LDY #0
 590 .ploop
 600 INC temp
 610 BNE ploop2
 620 INC temp+1
 630 .ploop2
 640 LDA (temp),Y
 650 BMI pdone
 660 JSR osasci
 670 JMP ploop
 680 .pdone
 690 PLA
 700 TAY
 710 JMP (temp)
 720 :
 730 .hexprt
 740 PHA
 750 LSR A
 760 LSR A
 770 LSR A
 780 LSR A
 790 JSR hexprt2
 800 PLA
 810 AND #&F
 820 .hexprt2
 830 ORA #ASC"0"
 840 CMP #ASC"9"+1
 850 BCC hexprt3
 860 ADC #6
 870 .hexprt3
 880 JMP osasci
 890 :
 900 ]
 910 NEXT
 920 ENDPROC
 930 :
 940 DEF FNequb(b%)
 950 ?P%=b%
 960 P%=P%+1
 970 =F%
 980 :
 990 DEF FNequs(b$)
1000 $P%=b$
1010 P%=P%+LEN(b$)
1020 =F%
```

Listing 2. Swapping variables

```
 10 REM First Byte Listing 2
 20 REM by Tessie Revivis
 30 REM For B/B+/M/C/E
 40 REM (C) Acorn User November 1987
 50 :
 60 source=&70
 70 dest=&72
 80 pblk=&600
```

Continued ►

◀ First Byte listing 2 continued

```
  90 PROCassemble
 100 A%=300
 110 B%=500
 120 PRINT"A%=";A%'"B%=";B%
 130 PRINT"Now call machine code"
 140 CALL &900, A%, B%
 150 PRINT"A%=";A%'"B%=";B%
 160 END
 170 :
 180 DEF PROCassemble
 190 FOR F%=0 TO 3 STEP 3
 200 P%=&900
 210 [OPT F%
 220 LDA pblk
 230 CMP #2
 240 BEQ pok
 250 BRK
 260 OPT FNequb(128)
 270 OPT FNequs("Wrong number of parame
ters")
 280 BRK
 290 :
 300 .pok
 310 LDA pblk +3
 320 CMP pblk +6
 330 BEQ tok
 340 BRK
 350 OPT FNequb(4)
 360 OPT FNequs("Type mismatch")
 370 BRK
 380 :
 390 .tok
 400 CMP #&80
 410 BNE tok2
 420 BRK
 430 OPT FNequb(129)
 440 OPT FNequs("Can't swap absolute st
rings")
 450 BRK
 460 :
 470 .tok2
 480 TAY
 490 BEQ saveadr
 500 LDY #3
 510 CMP #5
 520 BNE saveadr
 530 INY
 540 .saveadr
 550 LDA pblk+1
 560 STA source
 570 LDA pblk+2
 580 STA source+1
 590 LDA pblk+4
 600 STA dest
 610 LDA pblk+5
 620 STA dest+1
 630 .swap
 640 LDA (source),Y
 650 PHA
 660 LDA (dest),Y
 670 STA (source),Y
 680 PLA
 690 STA (dest),Y
 700 DEY
 710 BPL swap
 720 RTS
 730 :
 740 ]
 750 NEXT
 760 ENDPROC
 770 :
 780 DEF FNequb(b%)
 790 ?P%=b%
```

Continued ▶

◀ First Byte listing 2 continued

```
 800 P%=P%+1
 810 =F%
 820 :
 830 DEF FNequs(b$)
 840 $P%=b$
 850 P%=P%+LEN(b$)
 860 =F%
```

Listing 3. Passing an array

```
  10 REM First Byte Listing 3
  20 REM by Tessie Revivis
  30 REM For B/B+/M/C/E
  40 REM (C) Acorn User November 1987
  50 :
  60 DIM A%(20)
  70 base=&70
  80 count=&72
  90 limit=&74
 100 pblk=&600
 110 osnewl=&FFE7
 120 oswrch=&FFEE
 130 PROCassemble
 140 FOR loop=0 TO 20
 150 A%(loop)=loop
 160 NEXT
 170 CALL &900,A%(0)
 180 END
 190 :
 200 DEF PROCassemble
 210 FOR F%=0 TO 3 STEP 3
 220 P%=&900
 230 [OPT F%
 240 LDA pblk
 250 CMP #1
 260 BEQ pok
 270 BRK
 280 OPT FNequb(128)
 290 OPT FNequs("Too many parameters")
 300 BRK
 310 :
 320 .pok
 330 LDA pblk+3
 340 CMP #4
 350 BEQ tok
 360 BRK
 370 OPT FNequb(4)
 380 OPT FNequs("Type mismatch")
 390 BRK
 400 :
 410 .tok
 420 LDA pblk+1
 430 SEC
 440 SBC #3
 450 STA base
 460 LDA pblk+2
 470 SBC #0
 480 STA base+1
 490 LDY #0
 500 LDA (base),Y
 510 CMP #3
 520 BEQ aok
 530 OPT FNequb(15)
 540 OPT FNequs("Subscript")
 550 BRK
 560 :
 570 .aok
 580 INY
 590 LDA (base),Y
 600 STA limit
 610 INY
```

Continued ▶

First Byte listing 3 continued

```
620 LDA (base),Y
630 STA limit+1
640 INY
650 LDA #0
660 STA count
670 STA count+1
680 .prtloop
690 LDA #ASC"("
700 JSR oswrch
710 JSR ampprt
720 LDA count+1
730 JSR hexprt
740 LDA count
750 JSR hexprt
760 LDA #ASC")"
770 JSR oswrch
780 JSR spaceprt
790 LDA #ASC"="
800 JSR oswrch
810 JSR spaceprt
820 JSR ampprt
830 LDY #6
840 .prtval
850 LDA (base),Y
860 JSR hexprt
870 DEY
880 CPY #2
890 BNE prtval
900 JSR osnewl
910 LDA base
920 CLC
930 ADC #4
940 STA base
950 BCC inccnt
960 INC base+1
970 .inccnt
980 INC count
990 BNE chklmt
1000 INC count+1
1010 .chklmt
1020 LDA count
1030 CMP limit
1040 BNE prtloop
1050 LDA count+1
1060 CMP limit+1
1070 BNE prtloop
1080 RTS
1090 :
1100 .spaceprt
1110 LDA #ASC" "
1120 JMP oswrch
1130 :
1140 .ampprt
1150 LDA #ASC"&"
1160 JMP oswrch
1170 :
1180 .hexprt
1190 PHA
1200 LSR A
1210 LSR A
1220 LSR A
1230 LSR A
1240 JSR hexprt2
1250 PLA
1260 AND #&F
1270 .hexprt2
1280 ORA #ASC"0"
1290 CMP #ASC"9"+1
1300 BCC hexprt3
1310 ADC #6
1320 .hexprt3
1330 JMP oswrch
1340 :
1350 ]
1360 NEXT
1370 ENDPROC
1380 :
1390 DEF FNequb(b%)
1400 ?P%=b%
1410 P%=P%+1
1420 =F%
1430 :
1440 DEF FNequs(b$)
1450 $P%=b$
1460 P%=P%+LEN(b$)
1470 =F%
```

See Acorn Forum, page 53

Listing 1. Line number stripping in *Wordwise Plus*

```
SELECT TEXT
CURSOR TOP
REPEAT
REPEAT
A$=GCT$
A%=ASC A$
IF A%<33 OR (A%>47 AND A%<58) THEN DEL
ETE LEFT
UNTIL (A%>32 AND A%<48) OR A%>57
A$=GLT$
DISPLAY
UNTIL EOT
CURSOR TOP
REPEAT
REPLACE "|",""
UNTIL EOT
CURSOR TOP
DISPLAY
```

Listing 2. 64-row text screen display

```
10 REM 80x64 screen
20 REM by Martin Hesketh
30 REM for M/C only
40 REM (c) Acorn User November 87
50 :
60 *TV 0,0
70 mode=0
80 osword=&FFF1
90 osbyte=&FFF4
100 DIM buffer 10
110 IF mode=0 OR mode=3 nc=80 ELSE IF
mode=2 OR mode=5 nc=20 ELSE nc=40
120 PROCsetup
130 MODE 128+mode
140 MODE mode
150 VDU 23,1,0;0;0;0;
160 HIMEM=&1C00
```

◄ Acorn Forum listing 2 continued

```
170 start=&1C00
180 FOR I%=start TO start+5120 STEP 4
190 !I%=&20202020
200 NEXT
210 :
220 PROCprint(29,1,"Acorn Forum Nov 19
87")
230 PROCprint(20,3,"This is a demonstr
ation of 80 X 64 Text")
240 FOR line=10 TO 12
250 PROCprint(10,line,"ABCDEFGHIJKLMOP
QRSTUVWXYZabcdefghijklmnopqrstuvwxyz1234
567890")
260 NEXT line
270 PROCprint(0,15,"Now you have a go!
! . . . .")
280 x=0
290 y=17
300 :
310 REPEAT
320 key$=GET$
330 IF ASC(key$)=13 THEN y=y+1:x=0:GOT
O 380
340 IF ASC(key$)=127 THEN PROCdelete:G
OTO 380
350 PROCprint(x,y,key$)
360 x=x+1
370 IF x=nc THEN x=0:y=y+1
380 UNTIL FALSE
390 :
400 DEF PROCdelete
410 x=x-1
420 IF x=-1 THEN x=nc:y=y-1
430 PROCprint(x,y," ")
440 ENDPROC
450 :
460 DEF PROCprint(x,y,A$)
470 FOR I=1 TO LEN A$
480 char=ASC(MID$(A$,I,1))
490 PROCdefine
```

Continued ►

◀ **Acorn Forum listing 2 continued**

```
500 PROCdisplay
510 ?FNscreen(x,y)=char
520 x=x+1
530 IF x=nc THEN x=0:y=y+1
540 NEXT I
550 ENDPROC
560 :
570 DEF PROCdefine
580 IF y MOD2=0 type=0 ELSE type=1
590 VDU 23,254
600 IF type=1 PROCcheck1
610 PROCrdchardef(char)
620 FOR def=buffer+1 TO buffer+7 STEP
2
630 VDU ?def
640 NEXT
650 VDU 0,0,0,0
660 VDU 23,255
670 IF type=1 PROCcheck2
680 PROCrdchardef(char)
690 FOR def=buffer+2 TO buffer+8 STEP
2
700 VDU ?def
710 NEXT
720 VDU 0,0,0,0
730 ENDPROC
740 :
750 DEF PROCdisplay
760 *FX 112,2
770 PRINT TAB(x,y DIV2);CHR$254
780 *FX 112,1
790 PRINT TAB(x,y DIV2);CHR$255
800 ENDPROC
810 :
820 DEF PROCrdchardef(character)
830 ?buffer=character
840 X%=buffer MOD 256
850 Y%=buffer DIV 256
860 A%=10
870 CALL osword
880 ENDPROC
890 :
900 DEF PROCcheck1
910 PROCrdchardef(?FNscreen(x,y-1))
920 FOR def=buffer+1 TO buffer+7 STEP
2
930 VDU ?def
940 NEXT
950 ENDPROC
960 :
970 DEF PROCcheck2
980 PROCrdchardef(?FNscreen(x,y-1))
990 FOR def=buffer+2 TO buffer+8 STEP
2
1000 VDU ?def
1010 NEXT
1020 ENDPROC
1030 :
1040 DEF FNscreen(x,y)
1050 =start+y*nc+x
1060 :
1070 DEF PROCsetup
1080 DIM M% 100
1090 FOR pass=0 TO 2 STEP 2
1100 P%=M%
1110 [OPT pass
1120 .event
1130 PHA
1140 PHX
1150 LDA store
1160 CMP #1
1170 BNE shadow
1180 JSR selectmem
1190 LDA #2
```

Continued ▶

◀ **Acorn Forum listing 2 continued**

```
1200 STA store
1210 PLX
1220 PLA
1230 RTS
1240 :
1250 .shadow
1260 JSR selectmem
1270 LDA #1
1280 STA store
1290 PLX
1300 PLA
1310 RTS
1320 :
1330 .selectmem
1340 TAX
1350 LDA #113
1360 JMP osbyte
1370 :
1380 .esetup
1390 LDA #event MOD 256
1400 STA &220
1410 LDA #event DIV 256
1420 STA &221
1430 LDA #1
1440 STA store
1450 LDA #14
1460 LDX #4
1470 JMP osbyte
1480 .store
1490 EQUB 0
1500 ]
1510 NEXT pass
1520 CALL esetup
1530 ENDPROC
```

Listing 3. Disc back-up with sideways RAM

```
10 REM Single Drive B
ackup
20 REM by A Valentine
30 REM for B+128k/M/C
40 REM (c) Acorn User
November 87
50 :
60 pauseflag=&81
70 trackflag=&82
80 maxtrackread=24
90 maxtrack=&80
100 osnewl=&FFE7
110 oswrch=&FFEE
120 oscli=&FFF7
130 osword=&FFF1
140 osrdch=&FFE0
150 PROCassem(&900)
160 PRINT "Press <SPAC
E> to save code."
170 REPEAT UNTIL GET=3
2
180 A$="*SAVE SRCOPY F
FFF0900+"+STR$~(end-&900
)
190 PRINT A$
200 OSCLI A$
210 END
220 :
230 DEF PROCassem(M%)
240 FOR pass=0 TO 3 ST
EP 3
250 P%=M%
260 [OPT pass
```

Continued ▶

◀ **Acorn Forum listing 3 continued**

```
270 LDX #&FF
280 .loop
290 INX
300 LDA source,X
310 JSR oswrch
320 BNE loop
330 JSR readwrite
340 STA read
350 LDX #&FF
360 .loop1
370 INX
380 LDA destn,X
390 JSR oswrch
400 BNE loop1
410 JSR readwrite
420 STA save
430 LDX #&FF
440 .loop2
450 INX
460 LDA pause,X
470 JSR oswrch
480 BNE loop2
490 JSR osrdch
500 JSR oswrch
510 STA pauseflag
520 LDX #&FF
530 .loop3
540 INX
550 LDA tracks,X
560 JSR oswrch
570 BNE loop3
580 JSR osrdch
590 JSR oswrch
600 CMP #89
610 BNE tr40
620 LDA #80
630 STA trackflag
640 JMP start
650 .tr40
660 LDA #40
670 STA trackflag
680 .start
690 JSR osnewl
700 JSR osnewl
710 LDA #maxtrackread
720 STA maxtrack
730 .loop4
740 INC srdata+7
750 LDX #srdata MOD 25
6
760 LDY #srdata DIV 25
6
770 JSR oscli
780 LDA srdata+7
790 CMP #ASC"Z"
800 BNE loop4
810 .readgo
820 JSR rpause
830 .readdisc
840 INC read+7
850 LDA #&7F
860 LDX #read MOD 256
870 LDY #read DIV 256
880 JSR osword
890 .shiftup
900 LDA #&42
910 LDX #ramup MOD 256
920 LDY #ramup DIV 256
930 JSR osword
940 LDA maxtrack
950 CMP read+7
960 BEQ savedata
970 CLC
980 LDA #&A
990 ADC ramup+9
1000 STA ramup+9
1010 JMP readdisc
1020 .savedata
1030 JSR spause
1040 .savedisc
1050 LDA #&42
1060 LDX #ramdown MOD 2
56
1070 LDY #ramdown DIV 2
56
1080 JSR osword
1090 CLC
1100 LDA #&A
1110 ADC ramdown+9
1120 STA ramdown+9
1130 .savetodisc
1140 INC save+7
1150 LDA #&7F
1160 LDX #save MOD 256
1170 LDY #save DIV 256
1180 JSR osword
1190 LDA &80
1200 CMP save+7
1210 BNE savedisc
1220 LDA maxtrack
1230 CMP trackflag
1240 BEQ bye
1250 CLC
1260 LDA #maxtrackread
1270 ADC maxtrack
1280 CMP trackflag
1290 BCS adjust
1300 STA maxtrack
1310 JMP addrreset
1320 .adjust
1330 LDA trackflag
1340 STA maxtrack
1350 .addrreset
1360 LDA #0
1370 STA ramup+9
1380 STA ramdown+9
1390 JMP readgo
1400 .readwrite
1410 JSR osrdch
1420 JSR oswrch
1430 SEC
1440 SBC #48
1450 RTS
1460 .rpause
1470 LDX #&FF
1480 LDA pauseflag
1490 CMP #78
1500 BNE loop5
1510 RTS
1520 .loop5
1530 INX
1540 LDA source1,X
1550 JSR oswrch
1560 BNE loop5
1570 JSR osrdch
1580 RTS
1590 .spause
1600 LDX #&FF
1610 LDA pauseflag
1620 CMP #78
1630 BNE loop6
1640 RTS
1650 .loop6
1660 INX
1670 LDA destn1,X
1680 JSR oswrch
1690 BNE loop6
1700 JSR osrdch
1710 RTS
1720 .bye
1730 RTS
1740 .read
1750 EQUD &00190000
1760 EQUD &FF530300
1770 EQUB 0
1780 EQUB 42
1790 EQUB 0
1800 .srdata
1810 EQUS "SRDATA "
1820 EQUB 86
1830 EQUB 13
1840 .ramup
1850 EQUD &001900C0
1860 EQUD &000A0000
1870 EQUB 00
1880 EQUB 00
1890 .ramdown
1900 EQUD &00190040
1910 EQUD &000A0000
1920 EQUB &0
1930 EQUB &0
1940 .save
1950 EQUD &00190000
1960 EQUD &FF4B0300
1970 EQUB 0
1980 EQUB 42
1990 EQUB 0
2000 .source
2010 EQUB 12
2020 EQUB 13
2030 EQUS "Sideways Ram
Disc Copier by A.Valent
ine"
2040 EQUB 13
2050 EQUB 10
2060 EQUB 10
2070 EQUS "Enter source
drive              : "
2080 EQUB 0
2090 .destn
2100 EQUB13
2110 EQUB10
2120 EQUS "Enter destin
ation drive         : "
2130 EQUB 0
2140 .pause
2150 EQUB 13
2160 EQUB 10
2170 EQUS "Pause betwee
n read / write Y/N : "
2180 EQUB 0
2190 .tracks
2200 EQUB13
2210 EQUB10
2220 EQUS "Is it 80 tra
ck Y/N              : "
2230 EQUB 0
2240 .source1
2250 EQUB 7
2260 EQUS "Insert sourc
e disc and press a key.
"
2270 EQUB 13
2280 EQUB 0
2290 .destn1
2300 EQUB 7
2310 EQUS "Insert desti
nation disc and press a
key."
2320 EQUB 13
2330 EQUB 0
2340 .end
2350 ]
2360 NEXT
2370 ENDPROC
```

JOE'S JOTTINGS

Listing 4. Electron hardware scroller

```
   10 REM Hardware scrolling on the Electron
   20 REM by Carl Bateman
   30 REM for Electron only
   40 REM (c) Acorn User November 87
   50 :
   60 MODE 6
   70 INPUT TAB(10,10);"Which mode ";M%
   80 MODE M%
   90 S%=HIMEM
  100 SL%=&8000-HIMEM
  110 PROCintro
  120 PROCgraph
  130 REPEAT
  140 A$=GET$
  150 IF INSTR("Zz",A$)<>0 PROCscroll(64)
  160 IF INSTR("Xx",A$)<>0 PROCscroll(-64)
  170 IF INSTR("?/",A$)<>0 PROCscroll(-640)
  180 IF INSTR("*:",A$)<>0 PROCscroll(640)
  190 UNTIL 0
  200 END
  210 :
  220 DEF PROCintro
  230 PRINT'''''"This is an example of hardware scrolling on the Electron."
  240 PRINT''''
  250 PRINT"To move this display use the Z, X, ? and * keys."
  260 ENDPROC
  270 :
  280 DEF PROCgraph
  290 IF M%=3 OR M%=6 THEN PRINT''"Sorry, no graphics in mode ";M%;"!":ENDPROC
  300 MOVE 600,0
  310 FOR D=0 TO 9
  320 READ X%,Y%:DRAW X%,Y%
  330 NEXT
  340 DATA 300,0  ,300,300,600,300
  350 DATA 600,0  ,750,150,750,450
  360 DATA 450,450,300,300,600,300
  370 DATA 750,450
  380 ENDPROC
  390 :
  400 DEF PROCscroll(D%)
  410 S%=S%+D%
  420 IF S%>=&8000 S%=S%-SL%
  430 IF S%<HIMEM S%=S%+SL%
  440 R%=S% DIV 2:REM shift right
  450 H%=R% DIV &100
  460 L%=R% MOD &100
  470 A%=151:X%=3:Y%=H%
  480 CALL &FFF4
  490 A%=151:X%=2:Y%=L%
  500 CALL &FFF4
  510 ENDPROC
```

See Joe's Jottings, page 82

Listing 1. Framework toolkit

```
   10 REM Framework Toolkit
   20 REM by Joe Telford
   30 REM For B/B+/M/C/A
   40 REM (C) Acorn User November 1987
   50 :
   60 MODE 7
   70 PROCsetup
   80 ON ERROR PROCerr
   90 REPEAT
```

Continued ▶

◀ Joe's Jottings listing 1 continued

```
  100 REPEAT
  110 line$=FNinput
  120 UNTIL line$>""
  130 com$=LEFT$(FNextract,4)
  140 PROCdecodecommand
  150 UNTIL com$="EXIT"
  160 MODE 7:*BASIC
  170 END
  180 :
  190 DEF PROCsetup
  200 LOCAL loop%
  210 PROCcolours
  220 trace%=FALSE
  230 DIM oscar% 256
  240 PRINT cy$"Framework Toolkit V(1.00)"
  250 PRINT gr$"Another one of Joe's Jottings"
  260 PRINT ma$"Type COMMANDS or another command!"
  270 PRINT
  280 VDU 28,0,24,39,3
  290 ENDPROC
  300 :
  310 DEF PROCcolours
  320 re$=CHR$129:gr$=CHR$130:ye$=CHR$131
  330 ma$=CHR$133:cy$=CHR$134
  340 ENDPROC
  350 :
  360 DEF PROCblanks
  370 re$=" ":gr$=" ":ye$=" "
  380 ma$=" ":cy$=" "
  390 ENDPROC
  400 :
  410 DEF FNinput
  420 LOCAL line$
  430 INPUTLINE"]"line$
  440 =FNprocess(line$)+"|"
  450 :
  460 DEF FNprocess(L$)
  470 LOCAL a$,loop%
  480 a$=""
  490 IF L$<"@" THEN = ""
  500 FOR loop%=1 TO LEN L$
  510 char=ASC(MID$(L$,loop%,1))
  520 IF char>95 AND char<122 THEN a$=a$+CHR$(char AND 223) ELSE a$=a$+CHR$char
  530 NEXT loop%
  540 =a$
  550 :
  560 DEF FNextract
  570 LOCAL b$,I%,J%
  580 I%=0
  590 REPEAT
  600 I%=I%+1
  610 b$=MID$(line$,I%,1)
  620 UNTIL b$>"/" OR b$="|" OR b$=""
  630 IF b$="|" OR b$="" THEN =""
  640 J%=I%
  650 REPEAT
  660 J%=J%+1
  670 b$=MID$(line$,J%,1)
  680 UNTIL b$<"0" OR b$="|"
  690 b$=MID$(line$,I%,J%-I%)
  700 line$=MID$(line$,J%,LENline$)
  710 IF trace% PRINT ma$"trace]"cy$;b$,gr$;line$
  720 =b$
  730 :
  740 DEF PROCerror(ER$)
  750 VDU 7
  760 PRINT ye$;" "ER$
  770 ENDPROC
```

Continued ▶

◀ Joe's Jottings listing 1 continued

```
 780 :
 790 DEF PROCerr
 800 IF ERR=17 PROCerror("STOPPED!"):EN
DPROC
 810 REPORT
 820 PRINT " at line ";ERL
 830 END
 840 :
 850 DEF PROCdecodecommand
 860 IF com$="" ENDPROC
 870 IF com$="EXIT" ENDPROC
 880 IF com$="EXPL" PROCexplain:ENDPROC
 890 IF com$="COMM" PROCcommands:ENDPRO
C
 900 IF com$="TRAC" PROCtrace:ENDPROC
 910 IF com$="KEY" PROCkey:ENDPROC
 920 IF com$="PRIN" PROCprinter:ENDPROC
 930 PROCerror("I don't know how to "+c
om$+"...")
 940 ENDPROC
 950 :
 960 DEF PROCexexplain
 970 PRINT cy$"EXPLAIN <command>"TAB(35
)"EXPL"
 980 PRINT gr$"Explains the use of the
command typed:"
 990 PRINT gr$"Eg "cy$"EXPL EXIT"gr$"Ex
plains what EXIT does."
 1000 ENDPROC
 1010 :
 1020 DEF PROCexplain
 1030 para$=LEFT$(FNextract,4)
 1040 IF para$="EXIT" PROCexexit:ENDPROC
 1050 IF para$="EXPL" OR para$="" PROCex
explain:ENDPROC
 1060 IF para$="COMM" PROCexcommands:END
PROC
 1070 IF para$="TRAC" PROCextrace:ENDPRO
C
 1080 IF para$="KEY" PROCexkey:ENDPROC
 1090 IF para$="PRIN" PROCexprinter:ENDP
ROC
 1100 PROCerror("I can't explain "+para$
+"...")
 1110 ENDPROC
 1120 :
 1130 DEF PROCexexit
 1140 PRINT cy$"EXIT"TAB(35)"EXIT"
 1150 PRINT gr$"Exits from the program,
back to BASIC."
 1160 ENDPROC
 1170 :
 1180 DEF PROCexcommands
 1190 PRINT cy$"COMMANDS"TAB(35)"COMM"
 1200 PRINT gr$"Lists all the toolkit co
mmands."
 1210 ENDPROC
 1220 :
 1230 DEF PROCcommands
 1240 PRINT cy$"COMMANDS","EXPLAIN","EXI
T","TRACE"
 1250 PRINT cy$"KEY","PRINTER"
 1260 ENDPROC
 1270 :
 1280 DEF PROCextrace
 1290 PRINT cy$"TRACE <ON/OFF>"TAB(35)"T
RAC"
 1300 PRINT cy$"TRACE ON"gr$"shows comma
nd decoding."
 1310 PRINT cy$"TRACE OFF"gr$"cancels TR
ACE ON"
 1320 ENDPROC
 1330 :
 1340 DEF PROCtrace
 1350 para$=FNextract
```

Continued ▶

◀ Joe's Jottings listing 1 continued

```
 1360 IF para$="" THEN PROCerror("TRACE
<ON/OFF>"):ENDPROC
 1370 trace%=FALSE
 1380 IF para$="ON" THEN trace%=TRUE:PRI
NT cy$"Tracing......":ENDPROC
 1390 PRINT cy$"......no tracing."
 1400 ENDPROC
 1410 :
 1420 DEF PROCexkey
 1430 PRINT cy$"KEY <0...9> <string>"TAB
(35)"KEY"
 1440 PRINT gr$"Performs the same functi
on as "
 1450 PRINT gr$"*KEY in Basic."
 1460 ENDPROC
 1470 :
 1480 DEF PROCkey
 1490 para$=FNextract
 1500 IF INSTR("1023456789",para$)<1 OR
para$="" THEN PROCerror("KEY <0..9> <str
ing>"):ENDPROC
 1510 PROCoscli("KEY "+para$+" "+LEFT$(l
ine$,LENline$ -1))
 1520 ENDPROC
 1530 :
 1540 DEF PROCoscli($oscar%)
 1550 X%=oscar%MOD 256:Y%=oscar% DIV 256
 1560 CALL &FFF7
 1570 ENDPROC
 1580 :
 1590 DEF PROCexprinter
 1600 PRINT cy$"PRINTER <ON/OFF>"TAB(35)
"PRIN"
 1610 PRINT cy$"PRINTER ON"gr$"sends eve
rything to"
 1620 PRINT gr$"the printer until"
 1630 PRINT cy$"PRINTER OFF"gr$"is typed
."
 1640 PRINT gr$"The coloured display is"
 1650 PRINT gr$"temporarily lost while t
his"
 1660 PRINT gr$"command is functioning."
 1670 ENDPROC
 1680 :
 1690 DEF PROCprinter
 1700 para$=FNextract
 1710 IF para$<>"ON" AND para$<>"OFF" TH
EN PROCerror("PRINTER <ON/OFF>"):ENDPROC
 1720 IF para$="ON" PROCblanks:VDU 2:END
PROC
 1730 VDU 3:PROCcolours:PROCbuildtable
 1740 ENDPROC
```

Listing 2. Photographer's toolkit

```
 10 REM Photographers Toolkit
 20 REM by Joe Telford
 30 REM for B/B+/M
 40 REM (c) Acorn User November 1987
 50 :
 60 MODE 7
 70 PROCsetup
 80 ON ERROR PROCerr
 90 REPEAT
 100 REPEAT
 110 line$=FNinput
 120 UNTIL line$>""
 130 com$=LEFT$(FNextract,4)
 140 PROCdecodecommand
 150 UNTIL com$="EXIT"
 160 MODE 7:*BASIC
 170 END
 180 :
```

Continued ▶

JOE'S JOTTINGS

◀ **Joe's Jottings listing 2 continued**

```
 190 DEF PROCsetup
 200 LOCAL loop%
 210 PROCcolours
 220 trace%=FALSE
 230 ISO=100:DIN=21
 240 DIM oscar% 256
 250 DATA .8,1.1.2,1.6,2,2.5,3,4,5,6,8,
10,12,16,20,25
 260 DATA 32,40,50,64,80,100,125,160,20
0,250,320
 270 DATA 400,500,640,800,1000,1250,160
0,2000,2500
 280 DATA 3200,4000,5000,6400,8000,1000
0,12800
 290 DIM DIN(42)
 300 RESTORE
 310 FOR loop%= 1 TO 42
 320 READ DIN(loop%)
 330 NEXT
 340 DATA 11
 350 DATA 210,188,167,135,110,96,60,43,
30,20,12,7
 360 READ maxev
 370 DIM meter(maxev)
 380 FOR loop%=0 TO maxev
 390 READ meter(loop%)
 400 NEXT
 410 DIM EV$(28)
 420 PROCbuildtable
 430 PRINT cy$"Photographer's Toolkit V
(1.00)"
 440 PRINT gr$"Another one of Joe's Jot
tings"
 450 PRINT ma$"Type COMMANDS or another
 command!"
 460 PRINT
 470 VDU 28,0,24,39,3
 480 ENDPROC
 490 :
 500 DEF PROCcolours
 510 re$=CHR$129:gr$=CHR$130:ye$=CHR$13
1
 520 ma$=CHR$133:cy$=CHR$134
 530 ENDPROC
 540 :
 550 DEF PROCblanks
 560 re$=" ":gr$=" ":ye$=" "
 570 ma$=" ":cy$=" "
 580 ENDPROC
 590 :
 600 DEF PROCbuildtable
 610 RESTORE 620
 620 DATA "480","240","120","60 ","30 "
,"15 "," 8 "," 4 "," 2 "," 1 "
 630 DATA " 2 "," 4 "," 8 ","15 ","30 "
,"60 ","125","250","500"
 640 DATA " 1 "," 2 "," 4 ","ooo","ooo"
,"ooo","ooo","ooo","ooo","ooo"
 650 FOR loop%=0 TO 9:READ EV$(loop%):E
V$(loop%)=ma$+EV$(loop%):NEXT
 660 FOR loop%=10 TO 14:READ EV$(loop%)
:EV$(loop%)=ye$+EV$(loop%):NEXT
 670 FOR loop%=15 TO 18:READ EV$(loop%)
:EV$(loop%)=gr$+EV$(loop%):NEXT
 680 FOR loop%=19 TO 21:READ EV$(loop%)
:EV$(loop%)=cy$+EV$(loop%):NEXT
 690 FOR loop%=22 TO 28:READ EV$(loop%)
:EV$(loop%)=re$+EV$(loop%):NEXT
 700 ENDPROC
 710 :
 720 DEF FNinput
 730 LOCAL line$
 740 INPUTLINE"]"line$
 750 =FNprocess(line$)+"|"
```

Continued ▶

◀ **Joe's Jottings listing 2 continued**

```
 760 :
 770 DEF FNprocess(L$)
 780 LOCAL a$,loop%
 790 a$=""
 800 IF L$<"@" THEN = ""
 810 FOR loop%=1 TO LENL$
 820 char=ASC(MID$(L$,loop%,1))
 830 IF char>95 AND char<122 THEN a$=a$
+CHR$(char AND 223) ELSE a$=a$+CHR$char
 840 NEXT loop%
 850 =a$
 860 :
 870 DEF FNextract
 880 LOCAL b$,I%,J%
 890 I%=0
 900 REPEAT
 910 I%=I%+1
 920 b$=MID$(line$,I%,1)
 930 UNTIL b$>"/" OR b$="|" OR b$=""
 940 IF b$="|" OR b$="" THEN =""
 950 J%=I%
 960 REPEAT
 970 J%=J%+1
 980 b$=MID$(line$,J%,1)
 990 UNTIL b$<"0" OR b$="|"
 1000 b$=MID$(line$,I%,J%-I%)
 1010 line$=MID$(line$,J%,LENline$)
 1020 IF trace% PRINT ma$"trace]"cy$;b$,
gr$;line$
 1030 =b$
 1040 :
 1050 DEF PROCerror(ER$)
 1060 VDU 7
 1070 PRINT ye$;" "ER$
 1080 ENDPROC
 1090 :
 1100 DEF PROCerr
 1110 IF ERR=17 PROCerror("STOPPED!"):EN
DPROC
 1120 REPORT
 1130 PRINT " at line ";ERL
 1140 END
 1150 :
 1160 DEF PROCdecodecommand
 1170 IF com$="" ENDPROC
 1180 IF com$="EXIT" ENDPROC
 1190 IF com$="EXPL" PROCexplain:ENDPROC
 1200 IF com$="COMM" PROCcommands:ENDPRO
C
 1210 IF com$="TRAC" PROCtrace:ENDPROC
 1220 IF com$="KEY" PROCkey:ENDPROC
 1230 IF com$="PRIN" PROCprinter:ENDPROC
 1240 IF com$="ISO" PROCiso:ENDPROC
 1250 IF com$="QISO" PROCQiso:ENDPROC
 1260 IF com$="DIN" PROCdin:ENDPROC
 1270 IF com$="QDIN" PROCQdin:ENDPROC
 1280 IF com$="QMET" PROCQmeter:ENDPROC
 1290 IF com$="SERI" PROCserial:ENDPROC
 1300 IF com$="ON" PROCon:ENDPROC
 1310 IF com$="OFF" PROCoff:ENDPROC
 1320 IF com$="TIME" PROCtime:ENDPROC
 1330 IF com$="DELA" PROCdelay:ENDPROC
 1340 IF com$="INTE" PROCinterval:ENDPRO
C
 1350 IF com$="TRIG" PROCtrigger:ENDPROC
 1360 IF com$="EV" PROCev:ENDPROC
 1370 IF com$="TABL" PROCtable:ENDPROC
 1380 PROCerror("I don't know how to "+c
om$+"...")
 1390 ENDPROC
 1400 :
 1410 DEF PROCexexplain
 1420 PRINT cy$"EXPLAIN <command>"TAF
)"EXPL"
```

Continued ▶

◄ Joe's Jottings listing 2 continued

```
1430 PRINT gr$"Explains the use of the command typed:"
1440 PRINT gr$"Eg "cy$"EXPL EXIT"gr$"Explains what EXIT does."
1450 ENDPROC
1460 DEF PROCexplain
1470 para$=LEFT$(FNextract,4)
1480 IF para$="EXIT" PROCexexit:ENDPROC
1490 IF para$="EXPL" OR para$="" PROCexplain:ENDPROC
1500 IF para$="COMM" PROCexcommands:ENDPROC
1510 IF para$="TRAC" PROCextrace:ENDPROC
1520 IF para$="KEY" PROCexkey:ENDPROC
1530 IF para$="PRIN" PROCexprinter:ENDPROC
1540 IF para$="ISO" PROCexiso:ENDPROC
1550 IF para$="QISO" PROCexQiso:ENDPROC
1560 IF para$="DIN" PROCexdin:ENDPROC
1570 IF para$="QDIN" PROCexQdin:ENDPROC
1580 IF para$="QMET" PROCexQmeter:ENDPROC
1590 IF para$="SERI" PROCexserial:ENDPROC
1600 IF para$="ON" PROCexon:ENDPROC
1610 IF para$="OFF" PROCexoff:ENDPROC
1620 IF para$="TIME" PROCextime:ENDPROC
1630 IF para$="DELA" PROCexdelay:ENDPROC
1640 IF para$="INTE" PROCexinterval:ENDPROC
1650 IF para$="TRIG" PROCextrigger:ENDPROC
1660 IF para$="EV" PROCexev:ENDPROC
1670 IF para$="TABL" PROCextable:ENDPROC
1680 PROCerror("I can't explain "+para$+"...")
1690 ENDPROC
1700 :
1710 DEF PROCexexit
1720 PRINT cy$"EXIT"TAB(35)"EXIT"
1730 PRINT gr$"Exits from the program, back to BASIC."
1740 ENDPROC
1750 :
1760 DEF PROCexcommands
1770 PRINT cy$"COMMANDS"TAB(35)"COMM"
1780 PRINT gr$"Lists all the toolkit commands."
1790 ENDPROC
1800 :
1810 DEF PROCcommands
1820 PRINT cy$"COMMANDS","EXPLAIN","EXIT","TRACE"
1830 PRINT cy$"KEY","SERIAL","ON","OFF"
1840 PRINT cy$"ISO","QISO","DIN","QDIN"
1850 PRINT cy$"TIME","DELAY","INTERVAL","TRIGGER"
1860 PRINT cy$"QMETER","EV","TABLE","PRINTER"
1870 ENDPROC
1880 :
1890 DEF PROCextrace
1900 PRINT cy$"TRACE <ON/OFF>"TAB(35)"TRAC"
1910 PRINT cy$"TRACE ON"gr$"shows command decoding."
1920 PRINT cy$"TRACE OFF"gr$"cancels TRACE ON"
1930 ENDPROC
1940 :
1950 DEF PROCtrace
```

Continued ►

◄ Joe's Jottings listing 2 continued

```
1960 para$=FNextract
1970 IF para$="" THEN PROCerror("TRACE <ON/OFF>"):ENDPROC
1980 trace%=FALSE
1990 IF para$="ON" THEN trace%=TRUE:PRINT cy$"Tracing......":ENDPROC
2000 PRINT cy$"......no tracing."
2010 ENDPROC
2020 :
2030 DEF PROCexkey
2040 PRINT cy$"KEY <0...9> <string>"TAB(35)"KEY"
2050 PRINT gr$"Performs the same function as "
2060 PRINT gr$"*KEY in Basic."
2070 ENDPROC
2080 :
2090 DEF PROCkey
2100 para$=FNextract
2110 IF INSTR("1023456789",para$)<1 OR para$="" THEN PROCerror("KEY <0..9> <string>"):ENDPROC
2120 PROCoscli("KEY "+para$+" "+LEFT$(line$,LENline$ -1))
2130 ENDPROC
2140 :
2150 DEF PROCoscli($oscar%)
2160 X%=oscar%MOD 256:Y%=oscar% DIV 256
2170 CALL &FFF7
2180 ENDPROC
2190 :
2200 DEF PROCexprinter
2210 PRINT cy$"PRINTER <ON/OFF>"TAB(35)"PRIN"
2220 PRINT cy$"PRINTER ON"gr$"sends everything to"
2230 PRINT gr$"the printer until"
2240 PRINT cy$"PRINTER OFF"gr$"is typed."
2250 PRINT gr$"The coloured display is"
2260 PRINT gr$"temporarily lost while this"
2270 PRINT gr$"command is functioning."
2280 ENDPROC
2290 :
2300 DEF PROCprinter
2310 para$=FNextract
2320 IF para$<>"ON" AND para$<>"OFF" THEN PROCerror("PRINTER <ON/OFF>"):ENDPROC
2330 IF para$="ON" PROCblanks:PROCbuildtable:VDU 2:ENDPROC
2340 VDU 3:PROCcolours:PROCbuildtable
2350 ENDPROC
2360 :
2370 DEF PROCexiso
2380 PRINT cy$"ISO <no:>"TAB(35)"ISO"
2390 PRINT cy$"ISO 125"gr$"sets ISO and DIN rating"
2400 PRINT gr$"to nearest value shown."
2410 ENDPROC
2420 :
2430 DEF PROCiso
2440 LOCAL loop%,gap%,flag%,value,val
2450 gap%=30000
2460 para$=FNextract
2470 IF para$="" OR para$>CHR$(58) PROCerror("ISO <number>"):ENDPROC
2480 value=VALpara$
2490 IF value <=0 OR value >12800 PROCerror("ISO number out of range."):ENDPROC
2500 FOR loop%=1 TO 42
2510 val=ABS(value-DIN(loop%))
2520 IF val<gap% THEN gap%=val:flag%=loop%
```

Continued ►

◄ Joe's Jottings listing 2 continued

```
2530 NEXT
2540 ISO=DIN(flag%)
2550 DIN=flag%
2560 ENDPROC
2570 :
2580 DEF PROCexQiso
2590 PRINT cy$"QISO"TAB(35)"QISO"
2600 PRINT gr$"displays current ISO val
ue"
2610 ENDPROC
2620 :
2630 DEF PROCQiso
2640 PRINT cy$ISO" ISO"
2650 ENDPROC
2660 :
2670 DEF PROCexdin
2680 PRINT cy$"DIN <no:>"TAB(35)"DIN"
2690 PRINT cy$"DIN 21"gr$"sets ISO and
DIN rating"
2700 PRINT gr$"to nearest value shown."
2710 ENDPROC
2720 :
2730 DEF PROCdin
2740 LOCAL value%
2750 para$=FNextract
2760 IF para$="" OR para$>CHR$(58) PROC
error("DIN <number>"):ENDPROC
2770 value%=VALpara$
2780 IF value% <=0 OR value%>42 PROCerr
or("DIN number out of range."):ENDPROC
2790 DIN=value%
2800 ISO=DIN(DIN)
2810 ENDPROC
2820 :
2830 DEF PROCexQdin
2840 PRINT cy$"QDIN"TAB(35)"QDIN"
2850 PRINT gr$"displays current DIN val
ue"
2860 ENDPROC
2870 :
2880 DEF PROCQdin
2890 PRINT cy$DIN;" DIN"
2900 ENDPROC
2910 :
2920 DEF PROCexQmeter
2930 PRINT cy$"QMETER <EV/ABS>"TAB(35)"
QMET"
2940 PRINT cy$"QMETER EV"gr$"gives an E
V exposure"
2950 PRINT gr$"          reading based
on the ISO"
2960 PRINT gr$"          rating and the
 light level."
2970 PRINT cy$"QMETER ABS"gr$"gives a r
aw"
2980 PRINT gr$"          ADC reading f
rom 0 to 256"
2990 PRINT gr$"          based on the
light level."
3000 ENDPROC
3010 :
3020 DEF PROCQmeter
3030 LOCAL value,val,gap%,flag%,loop%
3040 para$=FNextract
3050 IF para$<>"EV" AND para$<>"ABS" PR
OCerror("QMETER <EV/ABS>"):ENDPROC
3060 value=FNadc(1)
3070 IF para$="ABS" PRINT cy$,value":25
6":ENDPROC
3080 gap%=256
3090 FOR loop%=1 TO maxev
3100 val=ABS(value-meter(loop%))
3110 IF val<gap% THEN gap%=val:flag%=lo
op%
```

Continued ►

◄ Joe's Jottings listing 2 continued

```
3120 NEXT
3130 EV=flag%+INT((DIN-21)*10/3+.5)/10
3140 PRINT cy$EV;" EV"
3150 ENDPROC
3160 :
3170 DEF FNadc(ch%)=(ADVAL(ch%)+ADVAL(c
h%)+ADVAL(ch%) +128) DIV 768
3180 :
3190 DEF PROCexserial
3200 PRINT cy$"SERIAL"TAB(35)"SERI"
3210 PRINT gr$"displays equipment seria
l numbers"
3220 ENDPROC
3230 :
3240 DEF PROCserial
3250 PRINT ma$"CAMERA"cy$"Canon T90
"gr$"1023016"
3260 PRINT ma$"CAMERA"cy$"Pentax ME Sup
er"gr$"5001959"
3270 PRINT ma$"LENS   "cy$"50F1.8CFD
"gr$"8402414"
3280 PRINT ma$"LENS   "cy$"80/210F3.8TA2
"gr$"4029223"
3290 PRINT ma$"LENS   "cy$"35/70 F3.5TA2
"gr$"17A 343212"
3300 ENDPROC
3310 :
3320 DEF PROCexon
3330 PRINT cy$"ON"TAB(35)"ON"
3340 PRINT gr$"turns on the cassette re
lay"
3350 ENDPROC
3360 :
3370 DEF PROCon
3380 VDU 11:PRINT re$:*MOTOR 1
3390 ENDPROC
3400 :
3410 DEF PROCexoff
3420 PRINT cy$"OFF"TAB(35)"OFF"
3430 PRINT gr$"turns off the cassette r
elay"
3440 ENDPROC
3450 :
3460 DEF PROCoff
3470 VDU 11:PRINT gr$:*MOTOR 0
3480 ENDPROC
3490 :
3500 DEF PROCextime
3510 PRINT cy$"TIME <secs>"TAB(35)"TIME
"
3520 PRINT cy$"TIME 10"gr$"turns the ca
ssette relay on"
3530 PRINT gr$"for 10 seconds"
3540 ENDPROC
3550 :
3560 DEF PROCtime
3570 LOCAL value
3580 para$=FNextract
3590 IF para$="" OR para$>CHR$(58) PROC
error("TIME <secs>"):ENDPROC
3600 value=VALpara$
3610 IF value <=0 PROCerror("Cannot tim
e "+para$+" seconds."):ENDPROC
3620 PRINT re$"Timing......";
3630 *MOTOR 1
3640 PROCtiming(value,"S")
3650 *MOTOR 0
3660 PRINT gr$"......OFF"
3670 ENDPROC
3680 :
3690 DEF PROCtiming(d,u$)
3700 d=d*100
3710 IF u$="M" d=d*60
3720 IF u$="H" d=d*3600
```

Continued ►

◀ Joe's Jottings listing 2 continued

```
3730 TIME=0
3740 REPEAT UNTIL TIME>=d
3750 ENDPROC
3760 :
3770 DEF PROCexdelay
3780 PRINT cy$"DELAY <offwait> <H/M/S>
<onsecs>"TAB(35)"DELA"
3790 PRINT cy$"DELAY 1 M 2"gr$"delays f
or 1 Minute, then"
3800 PRINT gr$"             turns the ca
ssette relay on";
3810 PRINT gr$"             for two seco
nds"
3820 ENDPROC
3830 :
3840 DEF PROCdelay
3850 ER$="DELAY <offwait> <H/M/S> <onse
cs>"
3860 LOCAL wait,on,unit$
3870 para$=FNextract
3880 IF para$="" OR para$>CHR$(58) PROC
error(ER$):ENDPROC
3890 wait=VALpara$
3900 IF wait <=0 PROCerror("Cannot time
"+para$):ENDPROC
3910 para$=FNextract
3920 IF INSTR("HMS",para$)<1 ="" PROCer
ror(ER$):ENDPROC
3930 unit$=para$
3940 para$=FNextract
3950 IF para$="" OR para$>CHR$(58) PROC
error(para$+"... is not a number."):ENDP
ROC
3960 on=VALpara$
3970 IF on <=0 PROCerror("Cannot time "
+para$):ENDPROC
3980 PRINT cy$"Waiting......"
3990 PROCtiming(wait,unit$)
4000 *MOTOR 1
4010 PRINT re$"Timing....";
4020 PROCtiming(on,"S")
4030 *MOTOR 0
4040 PRINT gr$"......OFF"
4050 ENDPROC
4060 :
4070 DEF PROCexinterval
4080 PRINT cy$"INTERVAL <off> <H/M/S> <
on> <rep>"TAB(35)"INTE"
4090 PRINT
4100 PRINT cy$"INTERVAL 30 M 1 20"
4110 PRINT gr$"delays for 30 minutes, t
hen turns"
4120 PRINT gr$"on the cassette for one
second and"
4130 PRINT gr$"repeats this 20 times"
4140 ENDPROC
4150 :
4160 DEF PROCinterval
4170 ER$="INTERVAL <off> <H/M/S> <on> <
rep>"
4180 LOCAL wait,on,repeats,unit$
4190 para$=FNextract
4200 IF para$="" OR para$>CHR$(58) PROC
error(ER$):ENDPROC
4210 wait=VALpara$
4220 IF wait <=0 PROCerror("Cannot time
"+para$):ENDPROC
4230 para$=FNextract
4240 IF INSTR("HMS",para$)<1 ="" PROCer
ror(ER$):ENDPROC
4250 unit$=para$
4260 para$=FNextract
```

Continued ▶

◀ Joe's Jottings listing 2 continued

```
4270 IF para$="" OR para$>CHR$(58) PROC
error(para$+"... is not a number."):ENDP
ROC
4280 on=VALpara$
4290 IF on <=0 PROCerror("Cannot time "
+para$):ENDPROC
4300 para$=FNextract
4310 IF para$="" OR para$>CHR$(58) PROC
error(para$+"... is not a number."):ENDP
ROC
4320 repeats=VALpara$
4330 IF repeats <=0 PROCerror("Cannot t
ime "+para$):ENDPROC
4340 FOR loop%= 1 TO repeats
4350 PRINT cy$"Loop ";loop%;" Waiting..
...."
4360 PROCtiming(wait,unit$)
4370 *MOTOR 1
4380 PRINT re$"Timing....";
4390 PROCtiming(on,"S")
4400 *MOTOR 0
4410 PRINT gr$"......OFF"
4420 NEXT
4430 ENDPROC
4440 :
4450 DEF PROCextrigger
4460 PRINT cy$"TRIGGER <light> <B/D>"TA
B(35)"TRIG"
4470 PRINT cy$"TRIG 44 B"gr$"fires the
cassette relay"
4480 PRINT gr$"             whenever the l
ight cell"
4490 PRINT gr$"             reads brighter
 than 44"
4500 PRINT cy$"TRIG 10 D"gr$"fires the
cassette relay"
4510 PRINT gr$"             whenever the l
ight cell"
4520 PRINT gr$"             reads darker t
han 10"
4530 PRINT 'cy$"Once triggered the ligh
t level must"
4540 PRINT cy$"return to its original s
etting"
4550 PRINT cy$"before triggering can re
occur, and"
4560 PRINT cy$"Escape exits this comman
d."
4570 PRINT 'cy$"QMETER ABS"gr$"should b
e used to"
4580 PRINT gr$"              check the lig
ht level."
4590 ENDPROC
4600 :
4610 DEF PROCtrigger
4620 LOCAL value,val
4630 para$=FNextract
4640 IF para$="" PROCerror("TRIGGER <li
ght> <B/D>"):ENDPROC
4650 value=VALpara$:IF value<=0 OR valu
e >255 PROCerror("Light level out of ran
ge!"):ENDPROC
4660 para$=FNextract
4670 IF para$<>"D" AND para$<>"B" PROCe
rror("TRIGGER <light> <B/D>"):ENDPROC
4680 count%=0
4690 REPEAT
4700 IF FNadc(1)>value AND para$="D" PR
OCblipcassette:REPEAT UNTIL FNadc(1)<val
ue
4710 IF FNadc(1)<value AND para$="B" PR
OCblipcassette:REPEAT UNTIL FNadc(1)>val
ue
```

Continued ▶

See Choose Your Words Wisely, page 90

◀ **Joe's Jottings listing 2 continued**

```
 4720 UNTIL FALSE
 4730 ENDPROC
 4740 :
 4750 DEF PROCblipcassette
 4760 *MOTOR 1
 4770 TIME=0:REPEAT UNTIL TIME>50
 4780 *MOTOR 0
 4790 count%=count%+1
 4800 PRINT cy$"triggered...";count%
 4810 ENDPROC
 4820 :
 4830 DEF PROCexev
 4840 PRINT cy$"EV <exp val> "TAB(35)"EV
"
 4850 PRINT cy$"EV 10"gr$"lists all the
possible"
 4860 PRINT gr$"      f-stops and shutte
r speeds"
 4870 PRINT gr$"      which will work wi
th EV10."
 4880 PRINT cy$"Use range 0 to 21 only"
 4890 PRINT ma$"purple shutter speeds =
seconds"
 4900 PRINT ye$"yellow = fractions (came
ra shake)"
 4910 PRINT gr$"green  = fractions (safe
holding)"
 4920 PRINT cy$"cyan   = fractions (1/10
00sec)"
 4930 PRINT re$"red    = out of shutter
range"
 4940 PRINT cy$"Use QMETER EV to read th
e light in"
 4950 PRINT cy$"Exposure values (linked
to film"
 4960 PRINT cy$"speed set by ISO or DIN"
 4970 ENDPROC
 4980 :
 4990 DEF PROCev
 5000 LOCAL ev
 5010 para$=FNextract
 5020 IF para$<>"0" AND VALpara$=0 PROCe
rror("EV <exp val> ...0-21"):ENDPROC
 5030 ev=VALpara$:IF ev<0 OR ev>21 PROCe
rror("Exposure value out of range 0-21")
:ENDPROC
 5040 PRINT cy$"F-stop 2  2.8  4  5.6  8
 11  16   22"
 5050 PRINT "EV ";ev;TAB(6);
 5060 FOR loop%=ev+7  TO ev STEP -1
 5070 PRINT EV$(loop%);
 5080 NEXT:PRINT
 5090 ENDPROC
 5100 :
 5110 DEF PROCextable
 5120 PRINT cy$"TABLE"TAB(35)"TABL"
 5130 PRINT gr$"lists all the possible"
 5140 PRINT gr$"f-stops and shutter spee
ds"
 5150 PRINT gr$"For each EV ... 0-20"
 5160 ENDPROC
 5170 :
 5180 DEF PROCtable
 5190 LOCAL ev
 5200 PRINT cy$"f-stop 2  2.8  4  5.6  8
 11  16   22"
 5210 FOR ev= 0 TO 20
 5220 PRINT "EV ";ev;TAB(6);
 5230 FOR loop%=ev+7  TO ev STEP -1
 5240 PRINT EV$(loop%);
 5250 NEXT:PRINT
 5260 NEXT
 5270 ENDPROC
```

Listing 1. ***Wordwise Plus*** **menu**

```
   10 REM Wordwise Plus menu
   20 REM by Philip Trinham
   30 REM for B,B+,M,C
   40 REM (C) Acorn User November 1987
   50 :
   60 MODE 7
   70 *FX 220,7
   80 ON ERROR PROCsyserror
   90 PROCinitialise
  100 A%=FNmenu
  110 IF A%=8 THEN $B%=FNfile
  120 IF A%>0 THEN *EXEC WWfkeys
  130 IF A%=0 THEN MODE 7
  140 *FX 220,27
  150 END
  160 :
  170 DEF PROCinitialise
  180 VDU 26,15
  190 options$="123456789*"+CHR$27
  200 ascii$=STRING$(100," ")
  210 ascii$=""
  220 FOR code%=32 TO 126
  230 ascii$=ascii$+CHR$(code%)
  240 NEXT
  250 A%=174
  260 X%=0
  270 Y%=255
  280 B%=128+(USR(&FFF4) DIV 256) AND &F
FFF
  290 A%=0
  300 oscommand=B%
  310 X%=oscommand MOD 256
  320 Y%=oscommand DIV 256
  330 Z%=0
  340 oscli=&FFF7
  350 up=11
  360 return=13
  370 escape=27
  380 star=42
  390 delete=127
  400 yellow$=CHR$(131)
  410 cyan$=CHR$(134)
  420 flash$=CHR$(136)
  430 double$=CHR$(141)
  440 cr=-74
  450 escape=-113
  460 off=0
  470 on=1
  480 ENDPROC
  490 :
  500 DEF FNmenu
  510 LOCAL choice
  520 PROCcursor(on)
  530 REPEAT
  540 REPEAT UNTIL NOT INKEY escape
  550 choice=FNoptions
  560 IF choice>ASC "0" THEN PROCshow(ch
oice-ASC "0")
  570 IF choice=star THEN PROCoscli
  580 UNTIL choice=escape OR choice>ASC
"0"
  590 PROCcursor(off)
  600 =choice-ASC "0"
  610 :
  620 DEF FNoptions
  630 CLS
  640 PRINT 'SPC(11); double$; yellow$;
"WW-PLUS ENTRY"
  650 PRINT SPC(11); double$; yellow$; "
WW-PLUS ENTRY"
  660 PRINT cyan$; "    (C) Acorn User 1
987"''
```

Continued ▶

◄ Choose Your Words Wisely listing 1 continued

```
  670 PRINT cyan$; "1)  Business letter"
  680 PRINT cyan$; "2)  Business letter
+ letter head"
  690 PRINT cyan$; "3)  Standard letter"
  700 PRINT cyan$; "4)  "
  710 PRINT cyan$; "5)  "
  720 PRINT cyan$; "6)  "
  730 PRINT cyan$; "7)  "
  740 PRINT cyan$; "8)  Edit existing do
cument"
  750 PRINT cyan$; "9)  No document"
  760 PRINT 'cyan$; "ESC Return to BASIC
"'
  770 PRINT "Please enter choice";
  780 =FNget(options$)
  790 :
  800 DEF PROCshow(chosen)
  810 PRINT TAB(0,5+chosen); flash$
  820 PRINT TAB(0,18); "Loading ";
  830 IF chosen=1 THEN PRINT "Business h
eader"
  840 IF chosen=2 THEN PRINT "Business h
eader and letter head"
  850 IF chosen=3 THEN PRINT "Standard h
eader"
  860 IF chosen=4 THEN PRINT "NO file" S
PC(4)
  870 IF chosen=5 THEN PRINT "NO file" S
PC(4)
  880 IF chosen=6 THEN PRINT "NO file" S
PC(4)
  890 IF chosen=7 THEN PRINT "NO file" S
PC(4)
  900 IF chosen=8 THEN PRINT "Document s
election program"
  910 IF chosen=9 THEN PRINT "NO file" S
PC(4)
  920 ENDPROC
  930 :
  940 DEF PROCscli
  950 LOCAL choice
  960 Z%=on
  970 CLS
  980 REPEAT
  990 PRINT "*";
 1000 VDU 14
 1010 $oscommand=FNinput(ascii$,90)
 1020 CALL oscli
 1030 VDU 15
 1040 PRINT 'cyan$; "*  Star Command";'
cyan$; "ESC Main Menu";
 1050 REPEAT choice=GET
 1060 UNTIL choice=escape OR choice=star
 1070 PRINT STRING$(14,CHR$(delete)); CH
R$(up); STRING$(17," "); CHR$(return);
 1080 UNTIL choice=escape
 1090 Z%=off
 1100 ENDPROC
 1110 :
 1120 DEF PROCcursor(assign)
 1130 VDU 23,1,assign;0;0;0;
 1140 ENDPROC
 1150 :
 1160 DEF FNget(allowed$)
 1170 LOCAL char
 1180 *FX 15,1
 1190 REPEAT
 1200 char=GET
 1210 UNTIL INSTR(allowed$,CHR$(char))>0
 1220 =char
 1230 :
 1240 DEF FNinput(allowed$,maxlen)
```

Continued ►

◄ Choose Your Words Wisely listing 1 continued

```
 1250 LOCAL char,str$
 1260 REPEAT
 1270 char=FNget(allowed$+CHR$(delete)+C
HR$(return))
 1280 IF char=delete AND LEN(str$)>0 THE
N str$=LEFT$(str$,LEN str$-1):VDU delete
 1290 IF char<>return AND char<>delete A
ND LEN(str$)<maxlen THEN str$=str$+CHR$(
char):VDU char
 1300 UNTIL char=return
 1310 REPEAT UNTIL NOT INKEY cr
 1320 =str$
 1330 :
 1340 DEF PROCsyserror
 1350 PROCcursor(on)
 1360 *FX 220,27
 1370 VDU 14
 1380 IF Z%=1 THEN PROCoserror
 1390 IF Z%=0 THEN REPORT:PRINT" at line
";ERL:END
 1400 ENDPROC
 1410 :
 1420 DEF PROCoserror
 1430 LOCAL goon
 1440 PROCcursor(off)
 1450 PRINT '':REPORT
 1460 PRINT ''"Operating system error";
 1470 goon=INKEY(400)
 1480 PROCcursor(on)
 1490 ENDPROC
```

See The Recursion Version, page 95

Listing 1. Quicksorting a list of integers

```
   10 REM Quick sort demonstration
   20 REM By Nick Wetherby
   30 REM For BBC B/B+/M/C/E/A
   40 REM (C) Acorn User November 1987
   50 :
   60 length%=10
   70 PROCchooselist
   80 PROCprintlist
   90 TIME=0
  100 PROCsortlist(1,length%)
  110 T%=TIME
  120 PROCprintlist
  130 PRINT T%/100; "seconds"
  140 END
  150 :
  160 DEF PROCchooselist
  170 DIM list%(length%)
  180 FOR A%=1 TO length%
  190 list%(A%)=RND(100)
  200 NEXT
  210 ENDPROC
  220 :
  230 DEF PROCprintlist
  240 FOR A%=1 TO length%
  250 PRINT list%(A%)
  260 NEXT
  270 PRINT
  280 ENDPROC
  290 :
  300 DEF PROCsortlist(bot%,top%)
  310 LOCAL lo%, hi%
  320 lo%=bot%
  330 hi%=top%
  340 F%=TRUE
  350 REPEAT
  360 IF list%(lo%)>list%(hi%) THEN PROC
swap(lo%,hi%):F%=NOT F%
```

Continued ►

◀ The Recursion Version listing 1 continued

```
  370 IF F% THEN hi%=hi%-1 ELSE lo%=lo%+
1
  380 UNTIL lo%=hi%
  390 IF bot%<lo%-1 THEN PROCsortlist(bo
t%,lo%-1)
  400 IF hi%+1<top% THEN PROCsortlist(hi
%+1,top%)
  410 ENDPROC
  420 :
  430 DEF PROCswap(lo%,hi%)
  440 temp%=list%(lo%)
  450 list%(lo%)=list%(hi%)
  460 list%(hi%)=temp%
  470 ENDPROC
```

Listing 2. Quicksorting addition to Joe's Jottings, October issue

```
   10 REM File sort 4 - Quicksort
   20 REM By Nick Wetherby
   30 REM For BBC B/B+/M/C/E/A
   40 REM (C) Acorn User November 1987
   50 :
   60 CLOSE# 0
   70 PROCreadfile("Clubdat")
   80 DIM spare$(fields%)
   90 PROCquick(1)
  100 PROCaddressdata
  110 END
  120 :
  130 DEF PROCquick(f%)
  140 PRINT"Quick sorting on field ";f%:
TIME=0
  150 PROCrecurse(f%,1,recno%)
  160 PROCtime
  170 ENDPROC
  180 :
  190 DEF PROCrecurse(f%,bot%,top%)
  200 LOCAL lo%, hi%
  210 lo%=bot%
  220 hi%=top%
  230 F%=TRUE
  240 REPEAT
  250 IF file$(lo%,f%)>file$(hi%,f%) THE
N PROCswap(lo%,hi%):F%=NOT F%
  260 IF F% THEN hi%=hi%-1 ELSE lo%=lo%+
1
  270 UNTIL lo%=hi%
  280 IF bot%<lo%-1 THEN PROCrecurse(1,b
ot%,lo%-1)
  290 IF hi%+1<top% THEN PROCrecurse(1,h
i%+1,top%)
  300 ENDPROC
```

See The Big Macro, page 101

Listing 1. Multi-macro spooler

```
   10 REM Viewstore macro spooler source
   20 REM by Graham Bell
   30 REM for B/B+/M/E + Viewstore/View
   40 REM (C) Acorn User November 1987
   50 :
   60 brkv=&202
   70 osfind=&FFCE
   80 osbput=&FFD4
   90 osasci=&FFE3
  100 osword=&FFF1
  110 osbyte=&FFF4
  120 :
  130 DIM store &FF
```

Continued ▶

◀ The Big Macro listing 1 continued

```
  140 FOR I%=0 TO &FF
  150 I%?store=0
  160 NEXT
  170 offset=store-&400
  180 :
  190 FOR pass=0 TO 2 STEP 2
  200 P%=store
  210 [
  220 OPT pass
  230 JMP output-offset
  240 RTS
  250 .last
  260 BRK
  270 .char
  280 BRK
  290 JMP close-offset
  300 RTS
  310 .nbrk
  320 OPT FNequw(break-offset)
  330 RTS
  340 .handle
  350 BRK
  360 :
  370 .text
  380 OPT FNequs(" ? emanelif orcaM")
  390 OPT FNequw(&0F0D)
  400 :
  410 .osblock
  420 OPT FNequw(filename-offset)
  430 OPT FNequb(&4FF-(filename-offset))
  440 OPT FNequb(33)
  450 OPT FNequb(126)
  460 :
  470 .openfile
  480 LDY #&12
  490 .message
  500 LDA text-offset,Y
  510 JSR osasci
  520 DEY
  530 BPL message
  540 LDA #0
  550 LDX #(osblock-offset)MOD256
  560 LDY #(osblock-offset)DIV256
  570 JSR osword
  580 BCC noescape
  590 LDA #&7C
  600 JSR osbyte
  610 BRK
  620 OPT FNequb(&80)
  630 OPT FNequs("Escape")
  640 BRK
  650 .noescape
  660 LDA #&80
  670 LDX #(filename-offset)MOD256
  680 LDY #(filename-offset)DIV256
  690 JSR osfind
  700 TAY
  710 BNE sethandle
  720 BRK
  730 OPT FNequb(&81)
  740 OPT FNequs("Can't open file")
  750 BRK
  760 :
  770 .close
  780 LDY handle-offset
  790 .closeall
  800 LDA #0
  810 JSR osfind
  820 .sethandle
  830 STA handle-offset
  840 .vector
  850 SEI
  860 LDA brkv
```

Continued ▶

◀ **The Big Macro listing 1 continued**

```
870 LDX nbrk-offset
880 STA nbrk-offset
890 STX brkv
900 LDA brkv+1
910 LDX nbrk+1-offset
920 STA nbrk+1-offset
930 STX brkv+1
940 CLI
950 RTS
960 :
970 .break
980 PHA
990 TXA
1000 PHA
1010 TYA
1020 PHA
1030 LDY #0
1040 JSR closeall-offset
1050 PLA
1060 TAY
1070 PLA
1080 TAX
1090 PLA
1100 JMP (brkv)
1110 :
1120 .output
1130 STA char-offset
1140 TXA
1150 PHA
1160 TYA
1170 PHA
1180 LDY handle-offset
1190 BNE isopen
1200 LDA #&0D
1210 STA last-offset
1220 JSR openfile-offset
1230 .isopen
1240 LDA #&0D
1250 CMP last-offset
1260 BNE notend
1270 CMP char-offset
1280 BEQ return
1290 LDA #&80
1300 JSR osbput
1310 .notend
1320 LDA char-offset
1330 STA last-offset
1340 BPL print
1350 AND #&7F
1360 BEQ htone
1370 LDA #&01
1380 .htone
1390 ORA #&1C
1400 .print
1410 JSR osbput
1420 BIT char-offset
1430 BMI return
1440 JSR osasci
1450 .return
1460 PLA
1470 TAY
1480 PLA
1490 TAX
1500 LDA char-offset
1510 RTS
1520 :
1530 .filename
1540 ]
1550 NEXT pass
1560 :
1570 sum=0
1580 FOR I%=0 TO &FF
```

Continued ▶

◀ **The Big Macro listing 1 continued**

```
1590 sum=sum+I%?store
1600 NEXT
1610 IF sum<>&500B PRINT '"Checksum err
or - please check listing":END
1620 :
1630 PRINT "Press <SPACE> to save code.
"
1640 REPEAT UNTIL GET=32
1650 PROCoscli("SAVE VSMACRO " + STR$~s
tore + " +100 40C 400")
1660 END
1670 :
1680 DEF FNequb(byte)
1690 ?P%=byte
1700 P%=P%+1
1710 =pass
1720 :
1730 DEF FNequw(word)
1740 ?P%=word MOD 256
1750 P%?1=word DIV 256
1760 P%=P%+2
1770 =pass
1780 :
1790 DEF FNequs(string$)
1800 $P%=string$
1810 P%=P%+LENstring$
1820 =pass
1830 :
1840 DEF PROCoscli(string$)
1850 DIM X% &FF
1860 Y%=X% DIV 256
1870 $X%=string$
1880 CALL &FFF7
1890 ENDPROC
```

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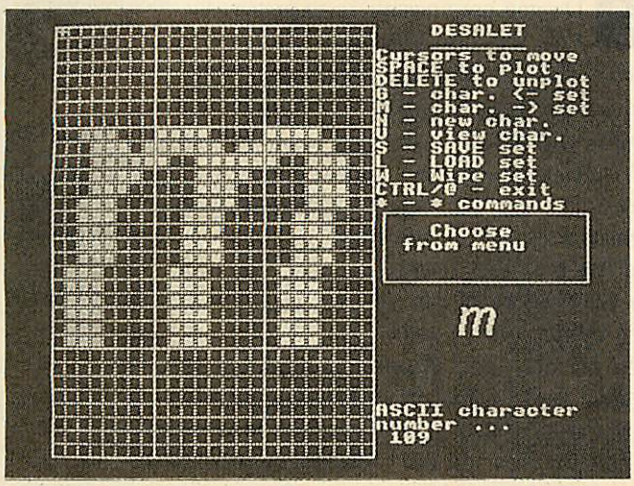
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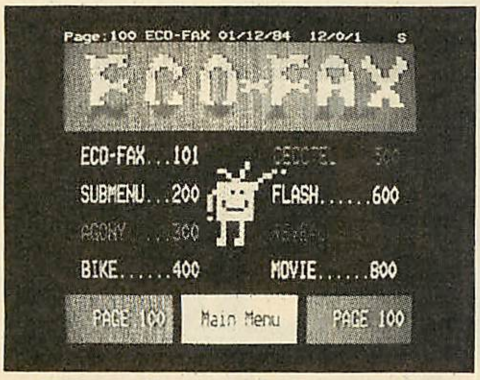
The *Desalet* program is a simple font creator which produces customised letters, to your personal design. It will save you from using repetitive data statements and error prone calculations. You can save your font set on disc and then call it up as needed. All previously saved sets can be modified or added to, and each set covers up to 94 characters.

Modical, a modification of the original *Calligraphy* program (September 1986 *Acorn User*) is also included on the disc. *Modical* allows the use of disc-based font sets created with *Desalet*. *Modical* also incorporates a modified file creation program, which permits files to be printed out immediately or saved for later printing.

An enhanced font ROM in the form of a sideways RAM image, is also on the disc. This allows you to design your own fonts for use on-screen. Any output to the printer will be in the new font – thus giving true WYSIWYG capabilities. There is a selection of new fonts to help you get started.

This superb disc comes in 5.25-inch, 40/80-track format and is great value at only £9.95.

L I S T I N G S



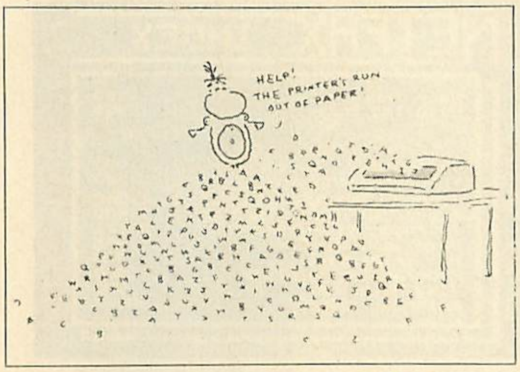
Easy learning with Education disc

BBC/B/ B+/M/ C

The *Acorn User* Education disc makes learning easy and enjoyable. The disc is packed with useful programs, including the *Eco-fax* database for Econets.

Graphics are a strong feature, and included on the disc are *Turtle Logo*, *Easyplot* and *Bulletin*, and you can then show off your creations with *Vufoil* and *Noticeboard* or make music with *Tunemaker*. Also included are an all-mode dumping routine for Epson compatibles and a teletext dumping routine for mode 7 dumping to Epson FX80 compatibles. All this for only £7.95.

D I S C S



Printer advice with Printer Help disc

BBC/B/ B+/M/ C

Often printer manuals don't fully cover the Master and BBC micro – our disc will help you to understand your printer's facilities for just £7.95.

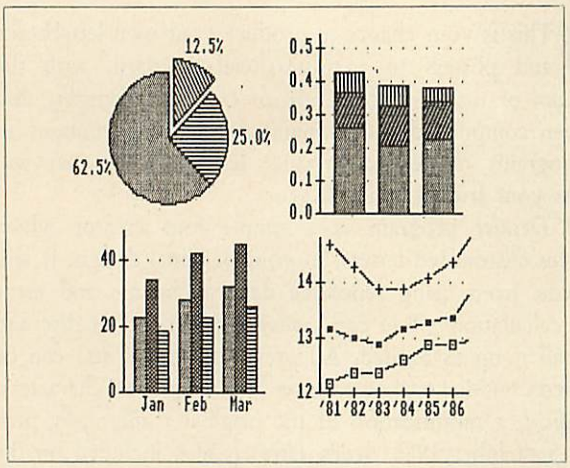
The 5.25-inch *Printer Help* disc illustrates various print type styles, use of *Wordwise* and *View*, screen images and printer care. There is an ASCII standard codes table and clear diagrams illustrating stages of printer use including advice on what to do if things go wrong.

For compatibility details write to Seran, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ.

Acorn User order form on page 130 – 24 hour telephone service (0672) 40825

OFFERS

CHART SOFTWARE



Improve your presentation with ViewChart

BBC/B/ B+/M/ C Do you use your micro to prepare figures? Perhaps in *ViewSheet* or *ViewStore*? Do you make printed reports? This business graphics program from *Acorn User* contributor Peter Sandford is aimed at anyone who uses figures, and wishes to improve the quality of their work.

ViewChart takes your numeric data from a *ViewSheet* or *ViewStore* file, or manual input, and plots various chart formats to screen. In one plot you can produce between one and five piecharts, stacked bar charts up to 25 bars, grouped bar charts up to 24 bars and line graphs with up to five lines each of 40 plotted points.

In practice, most business presentation data such as sales figures, departmental breakdowns, cost analyses and so on can be presented in a form even the boss will understand!

You can even add extra text and graphics to the completed chart prior to saving or printing. A screen dump program is provided, for Epson and compatible printers, which is specifically designed to fit the width of an A4 page. Instructions are provided on interfacing to other printers. *ViewChart* works in screen mode 0, using full shading effects, so what you see on screen is what you get on paper, and includes some tips on final presentation of graphics in documents.

ViewChart is supplied on 40-track 5.25-inch disc and works on the BBC models B and B+ and Master 128.

And the price of this professional software? Just £12.95.

DISCS



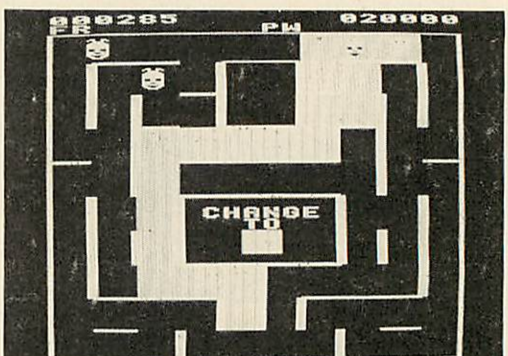
Network utilities for better communication

BBC/B/ B+/M/ C The *Network Utilities* 80-track disc is the logical addition to your network, combining invaluable routines with a sophisticated yet easy-to-use noticeboard.

Included is *Netfax*, our own hybrid information system providing access to thousands of pages of information. Other special features are: a file locator and directory size finder; network manager utilities including a bridge compatible screen viewer and a 'notify all' facility.

Plus there are 150 *Netfax* pages covering instructions, help and indexes, all on a 5.25-inch disc for £19.95.

CASSETTES



Games galore in our compendium cassette

BBC/B/ B+/M/ E You can guide Shuggy around his garden; puzzle over *Puzzle*, and be *3-D* amazed. Or destroy submarines with *Run Silent, Run Deep*. And for the really adventurous, go round the *Acorn User* office.

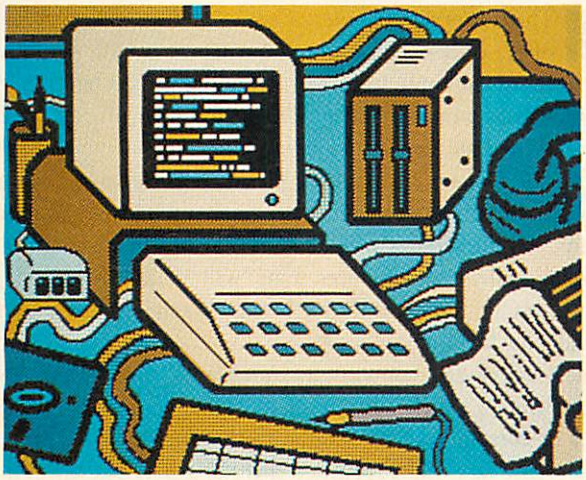
Best of all, try the truly different *Adventure* game written especially for the *Games Compendium* cassette by Rob Anderson. It's excellent value at £3.95.

You will also find David Acton's *Spectramania* and *Quadline* on this cassette: beat your micro, get four in a row. All are easily transferred to disc.

Acorn User order form on page 130 – 24 hour telephone service (0672) 40825

OFFERS

PROGRAM LISTINGS



Perfect photos with this month's listings

Joe Telford's photographic toolkit is a must for all your future photographic assignments. Joe has put together a suite of programs that will allow you to correctly expose all of your photographs. There is also a program to enable you to control an enlarger – use this program to enlarge your snaps.

Does your business often do mailings or send out press releases? If the answer is yes we can help you develop your macro format. When using *View* you have probably discovered that you are limited to 10 items and a mere 132 characters, which just isn't enough for some long addresses. Using our program you can get a multi-macro from *ViewStore* using your database for mailouts.

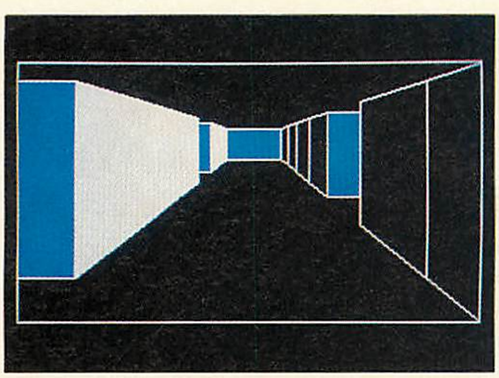
Find out how to use daisy-wheels, with Martin Phillips. There are many daisy-wheel printers, with different characters, typefaces and commands, now you can use them all.

From Forum there is a program which doubles the screen resolution of the Master to 64 lines of text. To save time when making backup discs use our program that enables you to backup all discs via sideways RAM. Carl Bateman explains four-directional hardware scrolling on the Electron.

Philip Trinham has put together a menu program for using *Wordwise Plus* including standard letter files. And there is an update to Joe's sorting programs from October 1987 issue.

November's listings are available in 5.25-inch 40/80-track format at only £5.95 or on cassette for £3.95.

LISTINGS

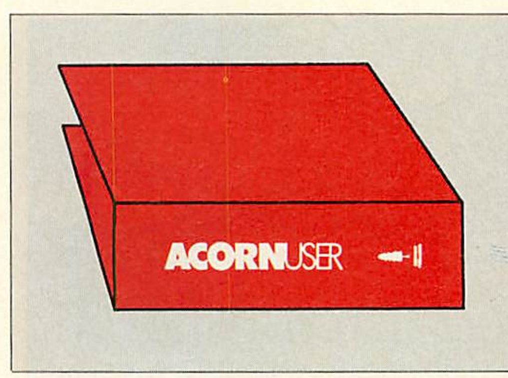


Monthly listings subscription special

Subscribing to the *Acorn User*'s monthly listings discs and cassettes will save you hours of typing and debugging the listings. For this issue only we are offering a subscription to our cassette listings for an unbeatable £35.00 – a saving of £10.00. Subscribers to the monthly listings discs will receive a free copy of *ViewChart* – worth £12.95 when they subscribe for the year.

The *Acorn User* monthly listings are great value, so be sure you receive the best programs, utilities and graphics and post your subscription today!

BINDERS



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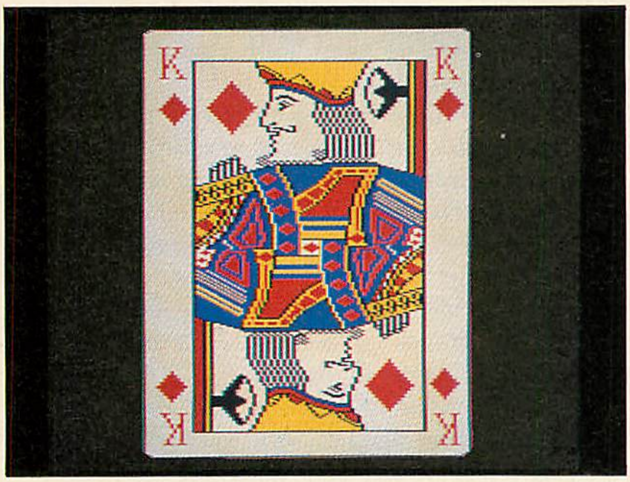
Our grey cloth disc binder is supplied with its own protective slip case and is filled with six transparent inserts, which will hold a year's supply of 5.25-inch monthly discs, and it is currently available at the special price of just £6.95.

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OFFERS

G A L L E R Y D I S C S



Special money-off Christmas offer

BBC/B/B+/M/C The *Gallery* and *Gallery Collection* discs are on special offer, only £3.95 each, a saving of £3.00 per disc, whichever of the three formats you choose. These two superb graphics discs would make an ideal Christmas gift for family or friends and an excellent stocking filler for the graphics fan.

Both the *Gallery* and *Gallery Collection* discs contain over 20 digitised, colourful, and stunningly produced graphics screens. All the screens will scroll automatically creating your personal gallery of pictures that will rival the best art institutions in the world!! Each screen can also be loaded individually for a closer look.

The *Gallery* disc contains two programs, *Pixel Editor* and *Super Painter*, which allow you to create your own masterpieces or edit the screens already on the disc. Included on the *Gallery* disc are old favourites including Thomas the Tank Engine and Malcolm Banthorpe's Coke Can.

The rich and famous, or sometimes infamous, put in an appearance on the *Gallery Collection* disc – Spitting Image, the Dallas crowd, Henry the VIII and Bugs Bunny are on the disc to entertain you.

All the screens on the *Gallery Collection* disc some in compressed format, with a program to help you compress and expand your own graphics screens.

This money-saving offer is only available while stocks last, so send in your orders now and beat the Christmas rush.

D I S C S



Disc for all sideways RAM users

BBC/B/B+/M/C The *Sideways RAM Utilities* disc includes: *RamPad* – your computer's answer to the pad and pen. *On-Screen Fonts* – a variety of print styles available in all graphics modes. * HLP ROM – add your own help text to call up when you're stuck. Standard ROM header for use when writing your own ROMs. * RLOOK to examine the contents of your ROMs and sideways RAM images.

There are many more utilities on this 40-track 5.25-inch disc with a transfer program for 80-track users, and it's competitively priced at £9.95.

D I S C S



Graphics utilities for your screens

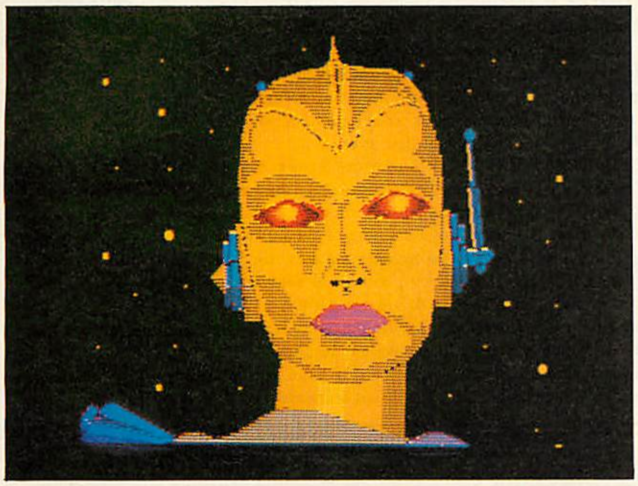
BBC/B/B+/M/C The 40-track 5.25-inch *Graphics Utilities* disc, keenly priced at £7.95, features 16 routines to manipulate blocks of graphics: rotation and reflection, a screen compressor/expander, a colour flood-fill routine and three mode conversion commands.

With the Basic procedure library are multi-height, proportional and justified text and 'drop shadow' boxes. A teletext screen editor gives point plotting, line drawing, rubber banding and flood fill, along with all mode 7 control codes. All can be used in your own programs.

Acorn User order form on page 130 – 24 hour telephone service (0672) 40825

OFFERS

D U M P R O M S



Printer control with the UserDump ROM

BBC/B/B+/M/C/E This pack includes the easy-to-fit *UserDump* ROM chip and a practical 22-page guide to the screen dump and printer control facilities offered – for just £19.95.

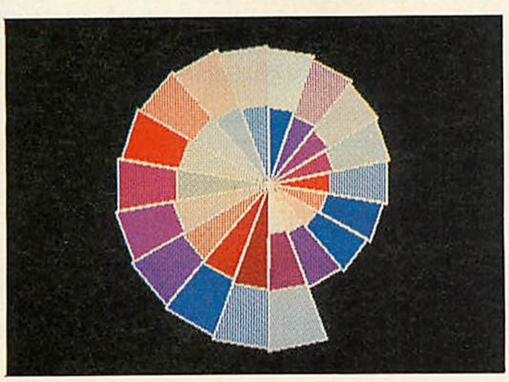
Once installed, *UserDump* will allow you to dump any screen image in any display mode by entering a single command – either as a line of your program or by typing in direct from the keyboard. A perfect dump can also be obtained while a machine code program is running.

UserDump features the following extra commands: *WDUMP – dump of graphics window only in any mode; *ZDUMP – a distortion-free dump of the mode 0 screen using plotter graphics; *TRANSIT – translate teletext screen into mode 1; *SHIFT ‹argument› – shift any area of memory; *IBM – select IBM printer; *CP80 – select CP80 printer.

UserDump is compatible with the BBC micro (model B or B+) fitted with operating system 1.2. Any earlier version will cause problems. *UserDump* is fully compatible with the Acorn 6502 second processor. It works with any printer which has single density and double density bit image graphics, including all Epson (LX, RX and FX) printers, Star Gemini and Delta, SG, SD and SR, Canon and Kaga NLQ. Also usable are the Shinwa and other CP80 printers.

There are many more commands available with *UserDump*, and details are available from Seran, Redwood Publishing Ltd., 20-26 Brunswick Place, London N1 6DJ.

R O M S

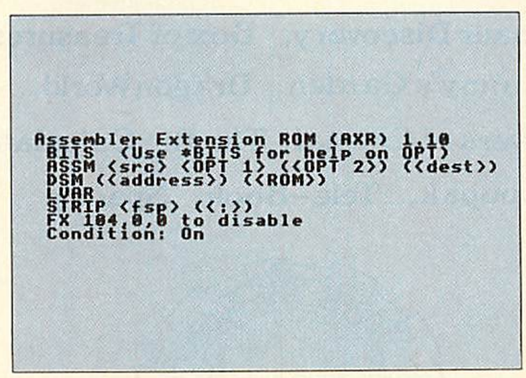


Your favourite Acorn User routines

BBC/B/B+/M/C/E Get *UserROM* for your favourite *Acorn User* routines. Plug in the ROM chip and 19 routines are instantly accessible via star commands, including colfill with 27 colourful fills; dotfill providing 23 new black and white shades; bad program recovery; variable lister; function key lister; a graphics compiler; a circle drawing routine and a sound compiler. There are many demonstration programs and a 22 page manual. All for £19.95.

Full details are available from Seran, Redwood Publishing Ltd., 20-26 Brunswick Place, London N1 6DJ.

R O M S

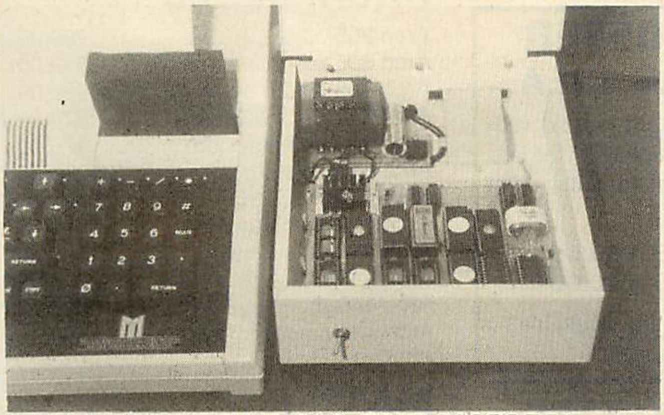


Acorn User Assembler Extension ROM

BBC/B/B+/M The *AXR* ROM, competitively priced at £19.95, is especially designed for use by machine code programmers. *AXR* adds a variety of options and commands to the Basic assembler, along with several new pseudo op codes, full Basic expression evaluation, and even the use of binary numbers. A disassembler is included in the software, and all 65C02 instructions can be used. *AXR* is compatible with Basic 1, 2 and Master.

Further details from Seran, Redwood Publishing Ltd., 20-26 Brunswick Place, London N1 6DJ.

Acorn User order form on page 130 – 24 hour telephone service (0672) 40825



EXTERNAL EPROM EXPANSION FOR BBC MODEL B + MASTER

'Master' EPROM Expansion

The expansion unit will hold up to 12 ROM's. The ROM's may be 8K, 16K or 64K. The unit is plugged into the 'Master' cartridge socket via a cable and adaptor. The ROM's are selected as 3 banks of 4 ROM's. Each bank can contain up to 16, 16K ROM images, if 27512 EPROM's are used. In addition, 16K bytes of battery backed up RAM can be fitted, this RAM can be read and write protected.

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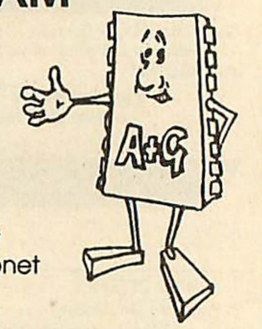
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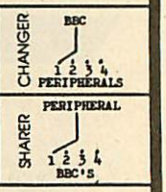
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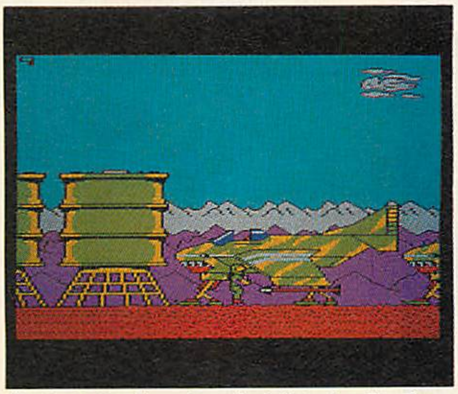
THE GAMES PAGE

David Lawrence surveys the latest releases, collections, hints and high scores

All quiet on the games front. I think the major companies are saving their best for Christmas, or maybe they're working on Archimedes games. The latest news from Superior is as follows: *Palace of Magic* is now out and from what I've seen of it, it looks very similar to *Citadel*. But I think there are just enough differences to make it a new game; it's reviewed in this issue. By the time you read this, *Play it again, Sam* – the next compilation – should be available. This sounds the best collection so far from Superior, and features *Citadel, Thrust, Ravenskull* and both the ordinary and enhanced versions of *Stryker's Run 1*. Unlike the previous two Superior collections there is no new game included.

From what I've heard, *Elixir* should be out sometime in November. Two other releases are also planned for then. The first is *Spellbinder*, said to be still under development. The second, The *Life of Repton*, is not some mythical *Repton 4;* instead it's yet more extra screens for *Repton 3*. As before there are five sets of eight screens featuring Repton. In the first, as a baby, he wears a nappy and must collect bottles of milk. Then it's off to school in a new uniform, and he must avoid the teachers. Set three reveals that, as a teenager, Repton was a punk – complete with spiky hair. After this he becomes a pencil pusher in an office. Finally, as an old man, he must fight off fearsome grannies in their rocking chairs! The screens are of a similar standard to *Around the World*.

Zarch is finished! All Archimedes owners can now rush out and buy a copy of the complete *Lander* game. There have been quite a few changes since the version we saw at the *Acorn User* Show; sound has now been added, crashing into enemy ships takes away less fuel, and you can now fire homing missiles and smart bombs. There is even an intelligent demo mode that plays itself and notches up a respectable score!



***Stryker's Run* from Superior's latest collection**

All in all, an impressive first game for the Arc, let's hope that other companies can match (or exceed) this standard.

Audiogenic's duo Peter Scott and Gary Partis have been bashing the buttons extra hard. They've now finished *Ransack* and *Impact* respectively. *Ransack* is a thinking person's shoot-em-up; you bounce along shooting anything that moves, collecting weapons and 'random bombs'.

I have yet to see Gary's *Impact*, so you'll have to wait until next month for more information. Peter has started work on an Atari ST game, and Gary is now working on the Arc, so maybe these will be the last Beeb games from these two.

Audiogenic has also signed up a game called *Dispatch Rider* – this is meant to be a cross between *Paperboy* and *Zaxxon*.

I've had a letter concerning Imagine's *Arkanoid* from someone who has signed themselves as 'ZZKJ'. It says, 'To skip a level, pause the game with Delete then press down the keys 'J', 'D' and 'H' together. You can also quit the game by pausing and pressing Tab. On the high score table, if you press 'P', 'A' and 'J' instead of Space, you carry on from the current screen, rather than restarting. Finally, if the ball is going far too fast, hold down Delete and Copy. This slows the game down and at least gives you a chance to hit the ball!'

Christopher Briscoe has some hints for *Sink the Bismark*. He writes 'Attack with the big guns first like King George V and Rodney, then bring in the carriers.' He goes on to describe a small cheat. 'Take the plane about halfway, drop the torpedo then tap the space bar every six or seven seconds and you won't lose a single plane!'

Here is the latest update to the highscore table. The last full table was published in the June issue so refer to that before submitting new high scores. Linus Surguy's times on *Revs* still hold although I've received some times very close to his:

Silverstone	1:24.3	N Gibbs
Snetterton	1:01.2	E Richardson

Can anyone break the one minute lap on Snetterton? Of course, anyone can cheat, but that misses the point, doesn't it? I now have a map of Tynesoft's *Futureshock*, thanks to Jonathan Leamouth. If you would like a copy, send a cheque for £1.50 and a large s.a.e marked Futureshock to the *Acorn User* address below and mark your envelope 'Futureshock'.

Finally, we would like to increase our coverage of Electron games. For this, we need a couple more people to join our team of reviewers. If you would like to do this, please send your name, address, daytime and evening telephone numbers and a list of what equipment you have (Plus 1, Plus 4 etc) to me here at *Acorn User*. You must also tell me why you think you'd be a good reviewer.

Acorn User, *Redwood Publishing Ltd., 20-26 Brunswick Place, London N1 6DJ.*

HIGH SCORE TABLE UPDATE

Game	Score	Name
Eagle's Wing	460,400	S Greenwood
Firetrack	375,900	S Gibson
Joust	19,950	S Brown
Repton 2	24,018	M Young

Spy Vs. Spy 1 is probably the most innovative program yet, with features never seen before on the BBC / Electron. A. & B. Review - "An excellent package, colourful and imaginative that BEEB owners rarely see. Give this one a try" ! Electron User "Overall 10/10. I have to say I have never had so much fun trying to outwit a computer at it's own game."

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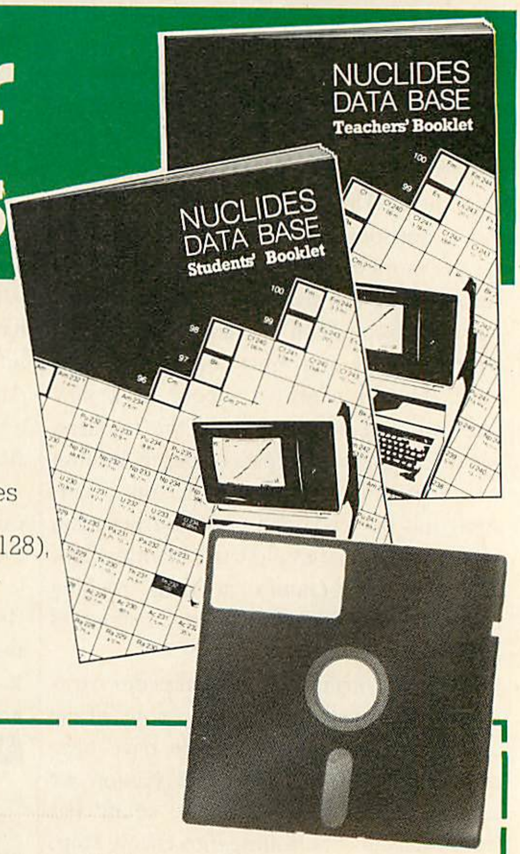
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GAMES

PALACE IS MAGIC



Palace of Magic; Superior Software; £9.95 (cassette), £11.95 (5.25-inch disc), £14.95 (3.5-inch disc).

To be perfectly honest, Superior should have subtitled this game *Citadel 2*. The similarity between this and the original *Citadel* is uncanny! There is even an evil wizard. Nothing wrong with that, of course, except his name is Caldeti!

In *Palace of Magic*, you must search for a transporter to escape to freedom. An assortment of creatures inhabit the palace and its surrounding land, including spacemen, white rabbits and a vicar. Some will help you in your quest, while others try their hardest to shorten your life-span.

For those of you who never saw the original game, locations – the palace for example – consist of several levels, connected with ropes and ladders. Colour-coded doors block the corridors at places throughout the game. In order to progress, the relevant key has to be found. Other barriers can block your path; the most annoying of which is when a wall is just that little bit too high to jump. You can see a passage off to the left just waiting to be explored, but you can't reach it!

The game is in mode 2 with creative use of colours to give shades and textures. There are some nice graphic touches with flickering candles and 'sparkling' magic top hats. The sound isn't much cop, with the odd ping or blip as you jump about. To be fair, there isn't really much scope for sound effects in games like this. For those of you who prefer to explore in perfect silence, there are sound on/off keys.

Having enjoyed *Citadel* the chance to relive my days of exploring and questing is very welcome. The usual Superior price of £9.95 is a small amount to pay for such a great game. I really enjoyed playing *Palace of Magic* and will keep playing until I complete it.

Robert Miller

ELECTRON TURNS THE CORNER



Crazee Rider; Superior Software; Electron BBC; £9.95 (cassette), £11.95 (5.25-inch disc), £14.95 (3.5-inch disc).

Crazee Rider is the best motorcycling game Electron racers have seen yet.

While BBC micro owners have been treated to several racing simulations, programming problems have prevented the translation of highly successful games such as *Revs* from BBC micro to Electron. This, however, is a genuine Electron game that fills in a real gap in the serious game player's collection.

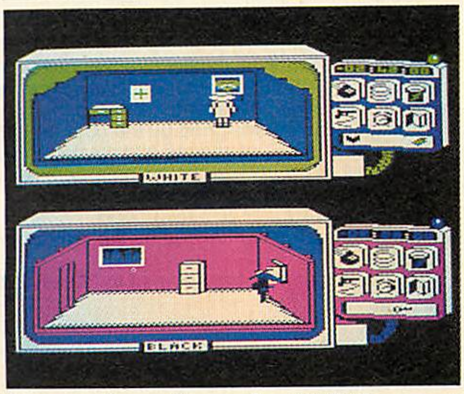
Crazee Rider puts you behind the controls of a 150mph motorcycle in a series of races which starts at Le Mans, and features six international race-tracks, with access to each subsequent race limited to those who qualify by finishing in the first six of the previous race, though there is a Jump option which allows players to jump between tracks they've qualified for.

The wide range of options includes the use of digital (First Byte) or Plus One joysticks, (though I found the keyboard easier to use), a choice of colour combinations, sound on/off, and a pause option.

Plus 3 owners will be pleased to see another worthwhile game on disc, though cassette owners will question the value of a full screen title page which takes a long time to load.

Bernard Emblem

SPYCATCHER ON DISC



Spy vs Spy; Tynesoft; BBC/Compact; £9.95 (cassette), £14.95 (3.5-inch and 5.25-inch discs).

Set in an embassy, *Spy vs Spy* is a one or two-player game with the aim of collecting various items in a briefcase before fleeing the country. The required objects – secret plan, passport, etc – are hidden at random behind pictures, hatstands and numerous other pieces of diplomatic furniture. As there is only one of each, the spies compete to find them first.

If you are too late, you can always try and steal the briefcase from your opponent before he makes it to the airport.

Perhaps the most innovative feature of the game is Simulvision – Tynesoft's tradename for the simultaneous display of the two rooms where the spies are rummaging. The graphics are three-dimensional and have been well designed.

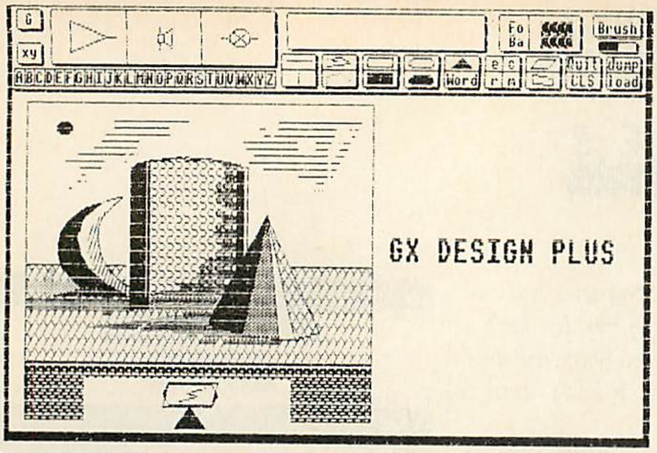
Each spy may set traps for the other. Bombs may be placed behind pictures and guns may be tied to doors with pieces of string. However, Simulvision permits the clever spy to note where traps await them.

There are traps with varying effects. After a few seconds, however, you return to rummage on. Well, it is only a game!

As a one-player game, *Spy vs Spy* could become dull quite quickly. The computer-controlled spy, lacking any intelligence at all, is surely in the wrong business. The spy invariably sets traps only to trigger them off seconds later.

However, as a two-player it really is a well-written and durable piece of programming. Fitting four hands on the keyboard takes a bit of practice, though.

David Acton



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SOFTWARE

HALCIEN DAYS

Yet another programming language for the BBC micro has been released by High-level Algorithms. Mark de Weger assesses it

With almost a dozen programming languages available for the BBC micro, you'd think there would be enough. Apparently not; a twelfth one, with the exotic name of Halcien, has shown up.

Halcien stands for High-level Algorithmic Computer Instruction Encoding Language, and was originally written to combine the best features of Forth and Algol '68, with some extensions. However, these two languages have been the basis of other programming languages, so Halcien has elements of many languages in it.

The software comes on a 16k EPROM and utilities disc, accompanied by a 250-page manual, a reference card and a function-key strip. It runs on the model B, B+ and the Master series.

Halcien is a general purpose language with extensions into graphics and text editing. One of its main features is its modular approach to programming; just like in Forth and Logo it is possible to define words (comparable to procedures in Basic) which then form an integral part of the language. The beauty of a modular approach is that a program can be divided into smaller modules, which can be individually written and tested.

Another major feature of Halcien is its use of stacks. A stack is like a pile on which data is pushed and later retrieved. The main one is the data stack, on which variables like integers and strings are stored. The problem in Forth of having to use Reverse Polish notation (1 2+ instead of 1 + 2) has been solved by adding an operator stack. However, if you need a language for number-crunching, you shouldn't use Halcien.

Many of the features from Pascal are also available, including all of the important data types such as records (called structures in Halcien) and pointers. But Halcien offers better string handling and a simple form of random access filing – a flexible way to store and access data on disc.

There are also omissions. The most remarkable one is the complete lack of trigonometric and logarithmic functions. A utility file on the disc offers these functions written in Halcien, but these are not suitable for serious use. Halcien also doesn't offer sets and enumeration types. Something else that is quite restrictive is that its is not possible to pass data of more than 255 bytes in length to a procedure. There are ways round this, but these don't encourage elegant programming.

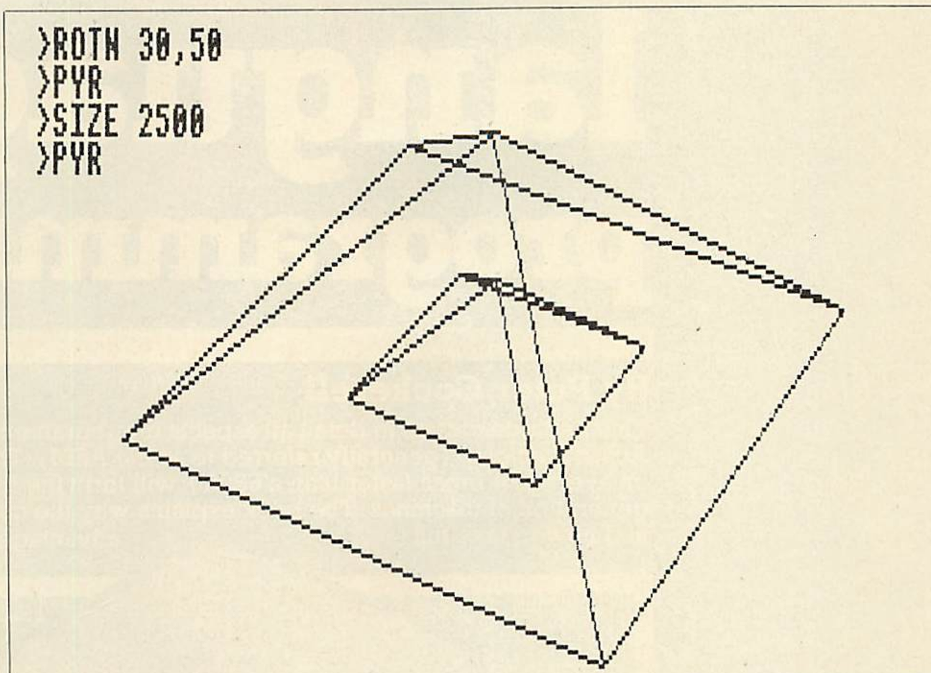


Figure 1. Halcien's powerful graphics facilities

Halcien performs conversions between variable types automatically. So if S is a string variable with the value '123' and I has been defined as an integer, a statement like I%=S is perfectly legal. Of course, this also has disadvantages, the main ones being that it can lead to untidy programming and errors that are not reported.

The language has an unusual approach to direct memory access. To read a part of the memory it is necessary to move this block into variables known by Halcien. This is quite a clumsy method and together with the slow speed at which Halcien programs run, it makes the language unsuitable for most interfacing applications. Machine code programs can be called from Halcien, but there is no built-in assembler.

One of the most striking characteristics of a program written in Halcien is the number of spaces it contains. Every word or number has to be separated from others by a space or a comma. When you have just started learning the language this leads to a disastrous number of errors, though you soon get used to it.

Text and graphics commands

Apart from being a general purpose language, Halcien is specialised in two fields: graphics and text manipulation.

Let us look at the text processing commands first. To be able to use these, a piece of text (called the ED file) should be present in the micro's memory. This file is then manipulated using commands similar to those of *Wordwise Plus*, but they are a lot more powerful.

The ease with which graphics can be programmed also forms a major feature of Halcien. At the simplest level it is possible to draw lines, boxes, arcs and so on. The SIZE and ROTN commands make it possible to change the scale and rotate drawings. This compensates for the lack of trigonometric functions.

However, the commands only work to full advantage in the definition of icons. An

icon is a sequence of graphics commands which is treated by the language as if it were a single unit.

All this is possible not only in two dimensions, but also in 3-D. The utilities disc contains a very impressive program in which an image of the earth as seen from space is displayed and rotated. The co-ordinates of the 900 points are calculated in less than 10 seconds. Perhaps the most impressive part is that the main section of the program listing fits easily on to just one A4 sheet of paper.

Listing 1 shows how a three-dimensional drawing can be partly built up from two-dimensional shapes. In this case the base of a 3-D pyramid is drawn in 2-D. The FIX POINT commands move the graphics cursor to the different corners of the base. Once the procedure has been defined, the pyramid can be viewed from all sides. It is worth noting that variables have to be declared before they are used, like in Pascal. The command:

```
ROTN 0,70,0 pyramid
```

for example, will produce a side view.

Performance

Just like ISO-Pascal programs, Halcien programs have to be compiled to some intermediate code, called H-code, before they are executed. This compilation is very fast (even the longest programs take only a few seconds to be processed) and results in very compact code.

Compiled Halcien programs take about half the space of Basic programs. However, my benchmarks showed they run about 25 per cent slower.

I composed Halcien with other languages using the Tak function, published in the November 1986 *Acorn User*. This measures the efficiency of recursion. The compiled code takes 64 bytes and the Tak (18,12,6) benchmark runs in 291 seconds. If we compare this to the results of other languages, the code is almost as compact as its Forth equivalent, but not very fast.

Error checking during program compilation is only very basic, which means that most errors will show up when running programs. Unfortunately you are given only the error number if a run-time error occurs. There is no message and no indication of where abouts in the program it occured. The latter can make it very difficult to debug Halcien programs properly.

```
PROC 'pyramid'
  2D BOX 200,200
  3D 100,100,-100
  FIX POINT 2
  GAP FIX POINT 3
  -100,100,-100
  FIX POINT 1
END_P

PROC 'pyr'
  ICON GAP -100,100
    pyramid
  END_IC
END_P
```

Figure 2. The procedure that produced figure 1

The editor

Built into the language is a full-screen editor to enable you to write programs directly. It's better than Basic's line editor, but I think it is the worst screen editor I have ever been forced to use.

You cannot move freely around with the cursor; if it is moved up or down, it jumps back to the start of the next line. There is a ruler on the line below the cursor which splits the text in a very irritating way, making it difficult to read.

Furthermore, scrolling is very slow. Scrolling down a mode 3 screen without making use of the 'jump' option takes about 15 seconds! And there is an awful tendency to overscroll.

The editor does offer some basic word-processing facilities, like search and replace and block move/delete, but it is incomprehensible to find such an editor in a language that is specially suited to text processing.

It is possible to use another word-processor for the preparation of program material, but that means you lose several advantages of the built-in editor, like easier debugging when the program is compiled.

The manual

The user-guide is a loose-leaf ring binder containing almost 250 pages. It's intended as a reference guide, and in that respect is quite good. But with a completely new language, a tutorial guide is an absolute must, and for that the manual is totally unsuitable. What's needed is a clear explanation of Halcien in the context of a course in structured programming.

The part of the user-guide covering the general purpose commands concentrates too much on how the language interpreter executes a program. It is technical, rather dry and contains too few examples.

With a new language like Halcien everything depends on the support that is given by the publisher. Fortunately this is very good. During this review, I made use of telephone assistance from the author. Some useful utilities have been developed and, according to the publisher, these will be made available to the users.

Conclusions

Unlike the publisher of Halcien, who claims the language is suited to many applications in every field of computer use, I feel it is useful in only a limited number of areas. Halcien is certainly not a language for beginners. The lack of teaching material and the bad error handling are the main reasons.

Although the modular approach of Halcien and its expression power make it potentially useful in education, the same disadvantages that make it unsuitable for beginners speak against its use in this field. Another important disadvantage in this respect is the fact that Halcien is a new and quite idiosyncratic language.

Basic programmers who just wish to learn a new programming language that gives more expression power and eases program development should consider Halcien. Halcien does have important advantages over a language like Pascal. However, I think that the disadvantages mentioned above will turn the scale in favour of Pascal most of the time.

The real market for Halcien lies with experienced programmers who want a language that is specially suited to graphics and text handling, or a flexible stack-based language. A program like *Gus* (*Acorn User*, March 1987), which is based on stack manipulation, could have been written in Halcien with much less effort.

It is good to see that people have so much trust in the BBC micro market that a new language is first written for it. An MS-DOS version of Halcien is under way. I think that Halcien's features fully justify its existence and that it is a useful addition to the programming languages already available.

Halcien. £49.95. Details from: High-level Algorithms Ltd., 12 Den Brook Close, Lydwell Park, Wellswood, Torquay, Devon TQ1 3TP. Tel: (0803) 22092.

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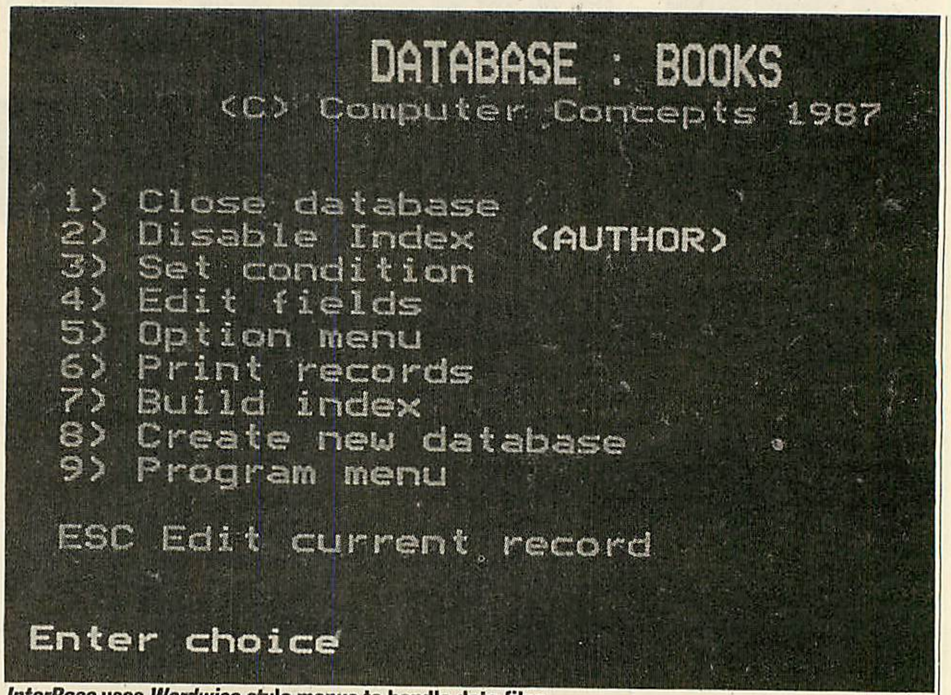
INSIDE INTERBASE

Bruce Smith has been waiting for the final part of Computer Concepts' *Inter* range – *InterBase*. This is his verdict

InterBase is the last of the *Inter* series of applications from Computer Concepts. As with its predecessors – *Chart, Sheet* and *Word* – it has been a long time coming and concludes what has to be the most integrated set of ROM software available for the BBC micro, based around the excellent ROM link concept.

Regular readers will know that I am not an *InterWord* convert, preferring *View 3*, although *InterSheet* and *Chart* have always been my first choice for spreadsheets and business graphics. I have always thought *ViewStore* to be the best all round database available for the BBC micro so, needless to say, I have been itching to see what *InterBase* can do.

InterBase is not a traditional database in the *ViewStore* mould which is devoted to the direct management and sorting of data. Like Minerva's *System Delta, InterBase* is used to write databases tailored to suit your own needs.



***InterBase* uses *Wordwise*-style menus to handle data files**

Unlike *System Delta, Inter-Base* is a complete language in its own right, not just an extension to Basic. However, it is very closely modelled on BBC Basic and reproduces just about every keyword – even ENVELOPE, whatever use that is in a database. As one would expect, there is a vast array of extra and extended file and string handling commands, which are needed to enable direct creation and manipulation of databases.

Implementing a full version of Basic is fine because most BBC micro users are now well versed in this language. But if Basic was a good enough environment in which to write sophisticated databases we wouldn't need *InterBase*. It all hinges on the extra string and file handling commands, yet after a day or two of *InterBase* programming I was still flummoxed by many of them.

The manual is dreadful. At first sight its 120 pages would seem to be cram packed with the stuff programmers love. In fact, the descriptions are short and terse, and the few examples are not documented and are taken out of context. No doubt the author knows what each command does – but he doesn't share the information clearly with the reader.

From the start *InterBase* appears like any other Computer Concepts product, presenting a reassuring mode 7 screen. Being a 64k ROM it will not work with a second processor, so serious work will probably need shadow RAM.

Starting up

The start-up screen places you in what can best be described as card-index mode. The card index is an application program which is always on tap and from which you can build most of your databases.

An example of its use is the address book on the disc of programs supplied with the product. The example is completely useless – a name, address and serial number database is hardly the sort of application you would pay £70 for.

Much better things are within the capabilities of the card-index program. Creating and building a database is a relatively simple task providing you have had some experience in this kind of thing. If not you, may have a struggle. The manual recommends editing the address book example on the disc but I would suggest you leave this well alone – in fact delete it from the disc – and start from scratch.

Once you have created a database you can manipulate it in a variety of ways, and in this area *InterBase* comes out very well.

Indexes are a vital part of any database, as they can make searching the data – a time-consuming task – a faster process. For example, the card index is quite capable of handling home and office records, perhaps a proper address book, clients' names, addresses and products or perhaps for stock control in a small business.

Taking the last example, a company may wish to keep strict control on the number of boxes of various products in store. In this case an index can be created which is built up from a field assigned to product quantity. The stock level can be monitored by searching on the 'quantity' index.

Using another option from the menu it is also possible to set search conditions – and these can be quite complex. For example, we could print out all products of which there are less than 10 in stock by setting the condition:

quantity<10

This can be made even more specific. For example:

quantity<10 AND
Product="Archimedes"

would search for all products called Archimedes of which there are less than 10.

Search strings are not limited to indexes alone – they can be applied directly to the database itself and the string being sorted can be ambiguous using the now standard * and # wild card characters.

Options menu

A further sub-menu is available from the main menu – the options menu – from which printer control code sequences are set (an excellent idea) and databases rebuilt.

The last option is a very important one. When a record is deleted from the database it is not actually wiped from the database. Instead the pointer that links it to the last record is altered. This means that no space in the database is saved by deleting records. If space is tight then the database can be rebuilt so that the deleted records are physically erased – similar to the way in which *COMPACT is used to close up unused space on a disc.

There is another reason why this should be done regularly, especially if you are planning to use the programming language to access a database created in the card index. Many of the commands which access records don't know which have been deleted. So if you have a database of 24 records, delete 6 and then write a program to access the records, then 24 will be looked for, not 18! If you do rebuild the database you must specify a destination filename, contrary to what the manual says.

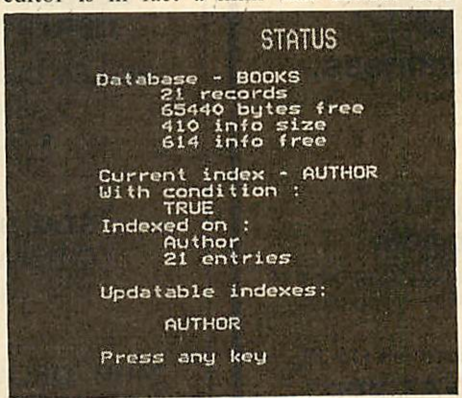
The card-index application will suit most common needs. It is capable of handling data in either string, integer number, real number, date or multi formats. What it isn't particularly good at is sorting data (programs are needed for this) so if you are going to need alphabetical lists of names, towns and so forth, you're going to have to do some difficult programming work.

Having set up a small database of books, I decided to set about writing a program that would provide some basic information about the database, namely the number of records, the number of fields in each record and which would then allow me to print out a field from each record.

The resulting program eventually worked but it took me an hour to get to this stage! I consider myself a competent Basic programmer but had to spend much of my time trying to work out from the manual the exact syntax of the various commands, and how they could be made to interact.

The programming menu is accessed from the main menu. The Escape key can then be used to toggle between the program area and the menu – just like *Wordwise*. Programs when written or loaded are stored in a string, by default P$.

Once written, and this is easy to do as the editor is in fact a mini text editor. The



Status display shows what's on file

program is 'run' by typing its letter from the menu screen. Unlike Basic, *InterBase* strings are not limited to 255 characters and so quite long programs can be written.

There are two major features that need to be fixed for the next version. First, when a program ends or aborts due to an error, you are presented with a '>' prompt. Press Return and you get the prompt again – this is disconcerting as it appears you have gone back into Basic – you haven't. You must press Escape to get to the 'Press any key' prompt. Second, if you press Escape during a disc access the program crashes, the screen goes blank and that's it. You press Break to start again.

For expert programmers, the language offers some exciting possibilities, particularly in the scientific fields. The incorporation of an ADVAL command means that a program could be written to capture incoming sampled data and log it into a database, sort it and display it, which opens up intriguing possibilities. Similarly, by using the serial port, data can be read from elsewhere. Linking my BBC to a Macintosh I was able to transfer ASCII data from it straight into *InterBase* – but only after I had managed to write the program.

Owing to the limited memory of the BBC micro, *InterBase*, like many other databases, relies heavily on the disc to move information in and out of memory – and as such there is a physical limit on how quickly files can be accessed. The language is obviously an interpreted one, and this imposes a further time restriction, so long and complicated programs can prove cumbersome. Speed is improved by using a TOKENISE command which converts the program into a more compact form. But this makes it impossible to edit, so always keep an ASCII version.

InterBase also seems to have a RAM filing system incorporated into it for use with sideways RAM. Unfortunately the single page used to describe it in the manual doesn't say how you use it.

The utilities disc contains several applications programs including a label printer which worked well, and two file converters – *Masterfile* and *ViewStore* to *InterBase*. I tried the *ViewStore* converter on about half a dozen files of various sizes – but it didn't work reliably, often giving a 'string too long' error.

Data transfer

The ROM link system allows data and information to be passed readily between any of the *Inter* packages. Using data created in *InterBase*, it is a simple matter to perform quite complex mail-emerging tasks. Addresses can be read from the database and imported into *InterWord* during printing by using an embedded command – ideal for anybody in the business of sending out mail-shots.

The process could go further – standard paragraphs could be held on file and called into *InterWord* as required. *InterChart* could extract data compiled in *InterBase* and plot it graphically, and of course databases could be built up using information from *InterSheet*.

InterBase is rather like my favourite Chinese meal – sweet and sour. There are some excellent facilities available – once you understand them. On the other hand, several facilities give the impression of having been rushed. What it desperately needs to make it a product worthy of the Computer Concepts name is a disc of applications – like those offered by Minerva for their *System Delta* – and a much better manual.

ViewStore is still the best all rounder, while I would recommend *System Delta* to readers who can program or whose requirements are covered by Minerva in their application software packages. *InterBase* is only for the more advanced user, particularly those who are already writing their own database or data logging programs in Basic. Computer Concepts can do better.

InterBase *is available from Computer Concepts, Gaddesden Place, Hemel Hempstead, Herts HP2 6EX. Tel: (0442) 63933. Price £69 including VAT.*

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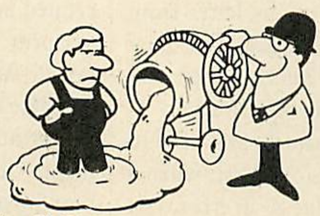
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SOFTWARE

THE MEANING OF MICROCODIL

Twenty years in the pipeline, MicroCODIL is a language for building expert systems. Steve Mansfield assesses its usefulness

Expert systems have finally made it out of the artificial intelligence labs – they've even suffered the indignity of becoming trendy.

This is a result of two converging factors – the increasing power of micros and the increasing elegance of software systems. This latter point is shown most clearly in MicroCODIL, a language which allows you to build useful expert systems and knowledge bases, and it succeeds in doing this even on a BBC.

True expert systems take a simple knowledge base further by adding structures which tie up the facts in meaningful ways, allowing, for example, a medical program to diagnose an illness even if the symptoms are incomplete and contradictory.

Expert systems work by defining rules, and this approach is also at the heart of MicroCODIL. You provide a framework – a set of rules and linking structures – and then feed in the information.

MicroCODIL owes something to languages newer than Lisp, particularly Prolog, in that rules are more explicitly stated. Yet there are several advantages to MicroCODIL over the Acornsoft MicroProlog package. Prolog is very greedy with memory. It is difficult to write meaningful programs in the limited space left after you've loaded in one of the friendly front-end systems, and the core syntax of Prolog is difficult to understand.

MicroCODIL, on the other hand, is a fairly simple language, and as such leaves plenty for space of data, which can be easily manipulated. The other great advantage is that the program doesn't expect the data you feed in to conform rigidly with the program's data structure. It can handle 'fuzzy' logic and data.

The fact that MicroCODIL uses the BBC micro's memory so economically is surprising. Like many languages, this one has found its way down from larger computers – in this case mainframes at Brunel University, where its author, Dr Chris Reynolds, is in the computer science department. He began developing the language 20 years ago. More recently, funding from the Micro Electronics Programme helped MicroCODIL find its way on to the BBC. The name stands for COntext Dependent Information Language.



Searching the example chemical solids database with MicroCODIL

The transplant has been successful, with none of the feeling of being a cut-down system that you get with some other languages. The system can seem strange to those raised on Basic, but it doesn't take long to get into it.

You can try out one of the many sample databases supplied with the package. These include a rather intriguing music database which highlights one of the systems most unusual features – you can have sound in your expert system as well as text. With one eye on the memory space, MicroCODIL works in mode 7. This is adequate, if unexciting, and Reynolds has made a good job of designing the screen layout. However, I'd like to see an option – or separate version – for machines with shadow memory to let you work in any mode. You could then use mode 0 or 3 for large amounts of text.

The language is targetted mainly at schools, and several additional knowledge bases have been produced to make the most of it. For example, the first to appear was *The History Project*, an educational system based on a group of Hertfordshire farms in the 19th century.

The documentation is excellent, providing both a tutorial and a reference source for the language.

Apart from the language's great potential in teaching, there is a lot to recommend it to home users. If you are interested in expert systems, but haven't got as far with Micro Prolog as you want to, then MicroCODIL is worth trying out.

Serious applications are possible too. The language could prove useful to scientists wanting to create intelligent databases or hobbyists needing to make sense of their obsession – amateur genealogists are one possible customer suggested by Reynolds.

The cost varies depending on the disc format you want, but starts at £50. Extra manuals and network licences are available. Extra project packs cost about a tenner.

Codil Language Systems, 33 Buckingham Road, Tring, Hertfordshire HP23 4HG.

CommunITel

HARDWARE

ON THE DOTS

The latest dot-matrix printer from Epson rivals daisy-wheels for quality and surpasses them for flexibility. David Atherton tests it out

Computers are not the only things that are getting faster and better. Printers now offer print quality, speed and versatility that was undreamt of a few years ago – particularly the fashionable and highly expensive laser printers. Yet while lasers hog the limelight, dot-matrix printers have improved to offer similar quality at a much lower price.

Of course, the top line models are still not exactly cheap. However, if you're looking to upgrade from a standard FX-type printer, it may be worth spending the extra to get a machine which will give you everything you're ever likely to need.

Ask any computer user to name a manufacturer of dot-matrix printers, and the name you will hear most often is Epson. The Japanese giant has always dominated the market, so much so that, like IBM in micros, being 'Epson-compatible' is a great boost to success for any other company.

The Epson MX, RX, FX and LX series have been nine-pin printers – the characters are formed from a matrix consisting of several columns of nine needles arranged vertically. I have been looking at one of the new breed of dot-matrix printers, the 24-pin range. With 24 needles occupying the same amount of space, the image has three times the resolution, giving a vast improvement in quality. Epson's base model in the 24-pin range is the LQ-800.

The Epson LQ-800 is an 80-column printer not dissimilar in styling to the earlier FX80. There are three panel switches, friction and tractor feed, and dip switches to control linefeeds, international variants and so on. The tractor feed, or 'pin feed', is a primitive unit, and Epson recommends that for regular tractor paper usage, an optional add-on unit is bought. The dip switches are conveniently accessible on the back panel.

An addition to the standard interfaces is the identity and font module socket. A standard parallel interface connector is present and, as with most printers, a serial interface is offered as an option.

The LQ in the title stands for letter quality printing. This is the main selling point of the machine. Look at the sample in figure 2 – the LQ printing is superb. If you do a lot of text printing, it is probably worth buying the printer for this alone. Also it's fast. Epson claims 60 characters per second (cps) for LQ printing, and 180 cps for draft mode. As usual, these figures represent the optimum situation, but the printer was about twice as fast as the FX in draft mode, and three times as fast as some software-based NLQ systems.

The letter quality type can be printed in pitches of 10, 12 or 15 characters per inch, or proportionally spaced. These settings are the same as most daisy-wheel typewriters and printers, so you'll be able to use the Epson with software intended for daisy-wheel layout. The codes for emphasised, double-strike, underline, italics, superscripts and so on are the same as on previous Epsons, so highlighting codes which are currently set for Epson FX machines will all work correctly.

The proportional spaced LQ text, which has the best appearance of all, suffers from the problem that you can't get the layout right on screen, but this is a function of the software, not the printer. Someone ought to sit down and measure the width of the

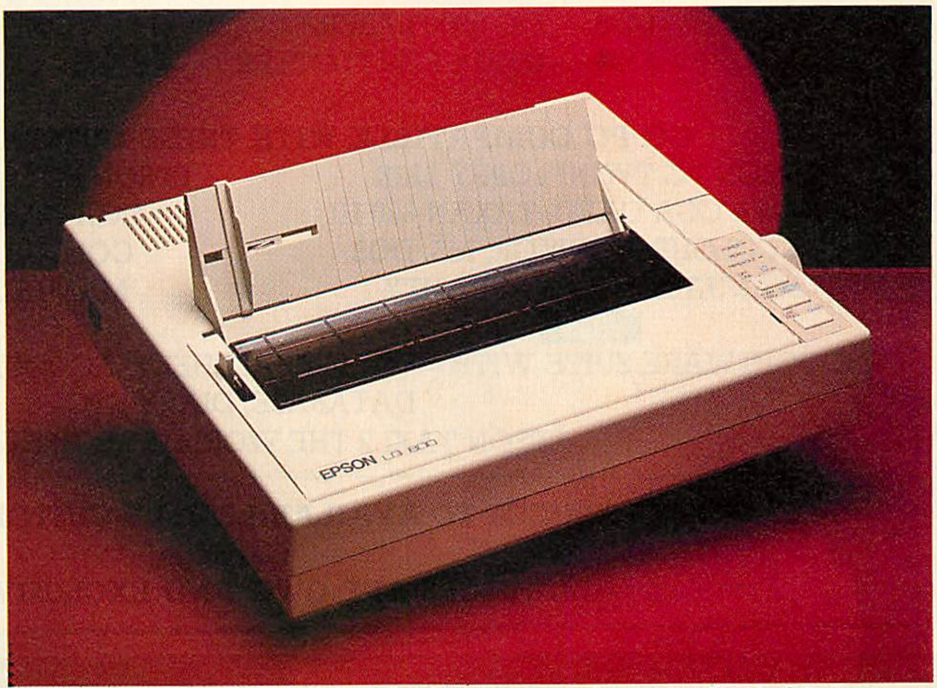


Figure 1. Epson's LQ-800 24-pin dot-matrix printer – a step up from conventional printers

ADDING ADDITIONAL FONTS

The LQ-800 accepts identity modules, which make the printer behave like another machine, and font modules which provide additional typefaces. Available identity modules are IBM, Diablo 630 (a popular daisy-wheel) and Epson. The latter is provided because the font modules plug into identity modules, so you must have an identity module in to use a new font.

Fonts available are SansSerif, Courier (a typewriter face), Prestige Elite, Script and OCR-B. The fonts are quite expensive at £44 each and, as you have to have an identity module at £60, the first one effectively costs £104. This is rather pricey and I'd recommend that you use one of the software downloadable font programs such as those produced by CJE Micros and Watford.

Epson is not working on a direct font interface for this machine. As the Epson identity module is the same price you might as well get one of the others, to get an extra feature.

proportional characters on an Epson, and write a program which correctly justifies proportional text!

In draft mode, the printer behaves almost identically to earlier models. The typeface used is somewhat different, but control codes all work in the same way. There are many new control codes such as cut-sheet feeder control, microspacing (at last!), and extra international character sets. The speed improvement mentioned above is a real bonus when printing listings, but otherwise it's not very different from the nine-pin printers.

One area that is not quite the same on the LQ-800 is bit-image graphics, as used in screen dumps. The line spacing codes now work in 60ths or 180ths of an inch as opposed to 72ths and 216ths. This means that standard dump software will generate a picture which is 20 per cent taller.

There are ways round this. You can alter the aspect ratios of dumps without altering the main screen dump program.

There are also five graphics modes using all 24 pins of the print head. These will obviously offer improved graphics, but the coding of graphics printing is totally different for 24 pins. Unless you have an LQ-800 dump program, you will be stuck with only nine-pin graphics images. Such a programs should soon appear.

The LQ-800 sports three separate manuals, a setup guide, an 'everyday user' manual and a reference guide containing all the Escape sequences. The guides are well written, in real English, with indexes. For once Epson acknowledges the existence of Acorn machines, even mentioning *Wordwise*! Epson has obviously recognised that it was weak in this area, and taken steps to improve. Nevertheless, a single-page summary of all the control codes would have been a useful addition.

The LQ-800 is a clear cut above all the nine-pin dot-matrix printers and, if you do masses of wordprocessing, and you can afford double what a nine-pin machine costs, I'd say buy it. You can get them with over £150 off the recommended price of £720. Heavy graphics users should check that their software can support the LQ's 24-pin graphics, or they'll be no better off than with a nine-pin machine.

Epson UK, Dorland House, 388 High Road, Wembley, Middlesex HA9 6UH. Tel: 01-902 8892.

```
The Epson LQ-800 is an vast improvement on previous Epson
models. Its 24-pin head gives a much smoother printout and
effectively  makes a daisywheel printer redundant. The
printer fully supports Epson control codes from earlier
models, but also has a host of new codes to allow you to
control the extra features of the machine.

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Figure 2. The print quality comes close to daisy-wheel standards, but the typeface is flexible

DOT-MATRIX, DAISY-WHEEL OR LASER?

Traditionally, microcomputer printers have been nine-pin dot-matrix (including ink jet and thermal), or daisy-wheel. Dot-matrix printers are flexible and can print graphics, but have always suffered from an inability to produce professional correspondence-quality text. The daisy-wheel printer produces output indistinguishable from a typewriter, and so has been the standard office letter-printing workhorse. However, daisy-wheels are slow, and cannot produce even simple graphics such as straight lines.

The new 24-pin printers, such as the LQ-800, produce correspondence-quality text. With the other advantages of speed and graphics, they effectively make the daisy-wheel redundant, and there is unlikely to be much further development of this type of printer, except perhaps in the intelligent typewriter market.

A new type of printer just beginning to appear is the laser printer. This behaves in a similar manner to a photocopier, accepting cut paper in a tray, and printing using toner cartridges. Laser printers have high resolution output (but only about the same as the top density on 24-pin matrixes) and are quiet and fast. They are still fairly expensive, costing upwards of £2000, although, like all new products, prices will fall in due course. Laser printers tend to offer much more in the way of special fonts and graphics, provided you have suitable software, but unfortunately there isn't much of this available for the BBC micro.

If you are buying a serious general purpose printer for business and professional use, you should really only consider 24-pin dot-matrixes and lasers. If your requirement is for quality wordprocessing and not full-blown desktop publishing (DTP), the laser printer, at three or four times the price of printers like the LQ-800, is an expensive luxury. Even with DTP, more and more packages are supporting the LQ as an output option, particularly the PC packages usable by 512 owners.

WORD PUZZLES

WORD PUZZLES is a suite of popular word puzzle programs including CROSSWORD, ANAGRAM CROSSWORD, CROSS REFERENCE, and CROSS-FIT. (You can buy any or all of them.) You can design and solve these puzzles quickly and easily.

The satisfaction and educational value of solving word puzzles cannot be under-estimated and designing your own puzzles may be something completely new - but with ABLE-SOFT's WORD PUZZLES this challenging and rewarding task comes easily within your reach.

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CROSS REFERENCE is similar to a CROSSWORD in that you have to guess where words are supposed to fit in a grid of boxes. But unlike a CROSSWORD there are no clues in the form of questions. Infact the answers are given to you but in the form of a number code.

The grid is full of squares with numbers in with a range of 1 to 26 (with the exception of the black squares). Each number corresponds to a particular letter of the alphabet, e.g. every number 8 could be the letter "R". You are usually given three letters to begin with and it is then up to you to find the corresponding letters to all the other numbers. All the letters of the alphabet are always used.



CROSSFIT

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EDUCATION

NEWS

ILEA to use Plotmate

The Inner London Education Authority has decided to endorse Linear Graphics' Plotmate plotter.

Dave Doyle of ILEA's Design and Technology Centre cites value for money as the reason for its choice, as well as its software support and its wide compatibility.

There is an increasing number of software vendors supporting Plotmate, for example, AMS with *AMX Stop Press* and Logotron with 3-D Logo.

Help with reading

Help is available for remedial reading teachers to get the child started. Prisma Software provides the motivation with its *Play and Read* series, which aims to make learning to read fun. The reading content is chosen from the McNally and Murray word list – the basis of many reading schemes.

Each package comprises an audio cassette featuring Patricia Hayes and Nik Cookson, two discs, four reading books, a coloured story book, six colour-coded word cards and an instruction book. Author Trude Salisbury originally conceived the package to help her son with his reading. Case studies of the course are available.

Play and Read costs £29.95 per pack and a detailed report on its development and method in practice is available at £1.50.

Baker's £19m boost to new technology

Education Secretary Kenneth Baker's new £19 million Government cash injection, revealed in the July issue of *Acorn User*, will boost the use of new technology across the curriculum. It will involve over 700 advisory teachers on two-year secondments. They will be drawn from a variety of subjects in a five-year IT program.

The scheme is being administered by the Microelectronics Education Support Unit (MESU) who have two weeks next summer to whip the advisory teachers into shape. The teachers will concentrate on their own subject area and its strengths in IT, rather than the broader application of IT. Groups of authorites forming consortia are likely to gain a larger slice of the advisory cake than those which stand alone. So the authorities who stuck with the old MEP regional structure are likely to benefit from their persistence.



Baker: buying guidelines

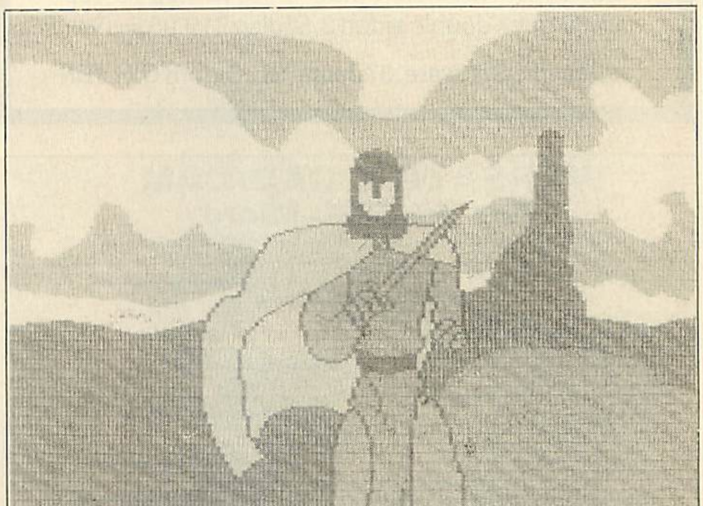
£8.5 million is destined for new computer provision. The strict DES buying guidelines do not exclude either the Archimedes or the RML Nimbus VX machines.

Initially many schools will lose imaginative and resourceful teachers to the advisory group. But the scheme should produce widely spread benefits and help to improve the status of new technology.

Printing program

ESM's *Screenprint* ROM helps those teachers who despair of programs that will not print their pictures, graphics or text. With a simple CTRL-P keystroke the program is frozen and the printer begins work. Once finished, the program resumes where it left off.

It was only possible to print out if the program specified it or if it could be modified to include a dump command. That might have been impossible because of copy protection. *Screenprint* costs £28.75.



Output from *Screenprint* from ESM

Sign software

Signwriter is a package for producing high-quality signs from a dot-matrix printer. This software makes labelling work and posting notices much easier, especially if your calligraphy skills are lacking! The utility generates impressive output from most dot-matrix printers.

Several fonts are available. The makers demonstrated the utility at the *Acorn User* Show, printing on plastics and fabric as well as the more conventional paper and sticky labels.

Mail order by micro

GSN Educational Software have released the fourth in their 'Micro at Work' series. *Mail Order* is a simulation of the data processing required in a mail order warehouse. Pupils from the age of nine upwards build their own catalogues, sell their wares and compete with other groups to make a profit – or a loss.

It comes with a Key system disc, *Mail Order* data disc, worksheets and a teacher's guide and costs £19.90.

Contacts

Acorn Computers: Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PD. Tel: (80223) 21441

ESM: 32 Bridge Street, Cambridge CB2 1UJ. Tel: (0223) 65445

Linear Graphics: 28 Purdeys Way, Rochford, Essex SS4 1NE. Tel: (0702) 541663/4/5

Mercury Educational Products: PO Box 194, Sevenoaks, TN15 8TZ

Prisma: PO Box 211, Chester CH1 3NJ. Tel: (0244) 26244

Wight Scientific: 44 Roan Street, London SE10 9JT.

Doubts over Arc image

by Carol Atack

Local education authorities and university computing departments are still unsure about the Archimedes. Despite the Acorn 'road show' presentations, and the DES circular reported on page seven this month, they remain confused about the relevance of its capabilities to their needs. It may take some time to dispel the view that such powerful machines just aren't needed yet.

The Archimedes' image means that it is viewed by many in the educational establishment as a machine most suitable for specialist use in science and engineering departments, and for large-scale number-crunching. At the University of East Anglia, Laurie Benfield in the Computer Centre said, 'We will not be buying the Archimedes until more software is available. Even then, we will not be recommending it to other departments, as it's really a scientific number cruncher and not what the average user needs.'

At Reading University, the Computer Centre is awaiting the arrival of a Unix-like operating system before the Archimedes will merit consideration. Even then, it is expected to be used initially only by departments who can make full use of its power and speed.



Archimedes: more software needed

Software availability is the main concern of potential buyers. Although much has been promised, including advanced word processing and data management software, the first programs to be released have been language and toolkit programs of specialist appeal.

Grafox' spreadsheet and time management package *Logistix*, and the educational programming environment Logo are the most interesting software to be announced so far, and neither is on the shelves yet, but are expected very shortly.

Schools seem more likely to buy the Archimedes as advisers search for a replacement for ageing BBC Bs. Many local education authorities are busy evaluating the Archimedes machines in the light of the DES circular and its recommendations on such matters as MS-DOS compatibility and WIMP environments. Here the Archimedes is competing with the Research Machines Nimbus, and in particular the new VX286 and 386 models. The Archimedes is considerably cheaper, but the Nimbus has some advantage in its readily available and proven software. However, as predicted by Research Machines itself, the BBC name will help the Archimedes find acceptability.

It would seem that either a refocusing of the image or the release of a convincing amount of software with wide appeal is necessary for the Archimedes to achieve its hoped-for success in the education market.

Compact sales revive after price cut

Acorn has reversed its policy against modifications to the basic specification of the Master Compact. And following the recent price cut, there have been more educational sales.

The Compact has been criticised by educationalists over its lack of a DFS and of interface ports found on a BBC model B. The adoption of ADFS and a 3.5-inch disc drive caused many to hesitate. No 5.25-inch disc option is available, and Acorn provides no simple means of transferring files. Only West Glamorgan LEA bought large numbers.

First Acorn added a 1770 DFS ROM image to the Welcome disc. Now it is bundling in the Mertec Compact Companion with educational orders. The bolt-on unit provides user port, analogue port, 2MHz bus and 1770 DFS ROM, and brings the machine more into line with the market's wishes.

An Acorn spokesman told *Acorn User* that the Compact's performance in the UK was now improving. He added that, with Eltec likely to produce a wordprocessing package comprising Compact, mono monitor and a good printer to compete directly with the Amstrad 8256, there seems every reason to feel the Compact still has a future in schools. With educational discount the Compact plus Companion but without monitor is now available at £344 inc VAT. The Mertec Companion alone costs £39.95.

EDUCATION

PRESS BARON PUPILS

DTP has come to the classroom. What are its applications and advantages?

Chris Drage and Nick Evans

'I claim that if every child in the country had routine access to wordprocessing for about half an hour a day, we could throw away most of our remedial reading and spelling exercises and get on with the curriculum.' So says Derek Maxted in *Getting into Print*, available from MEDU.

Teachers now are realising that the wordprocessing power of the micro has been harnessed into something even more powerful, something which many see as an even more important educational tool — desktop publishing, or DTP. This allows text and also graphics to be handled on-screen, providing an environment in which children can present the outcome of their work. Skills of presentation gain importance, as well as the usual linguistic considerations, and the end result is something of which children of all age ranges and abilities can be proud.

This article will examine the possibilities of DTP in the school, look at some of the software packages available, and concentrate on the package called *Typesetter!* from Sherston. It will also draw on the excellent work of Derek Maxted in *Getting into Print*, the book which no teachers' resource room should be without.

What is available?

The sophistication of on-screen composition offered by *Stop Press, Fleet Street Editor* and *Typesetter!* is all very well – but where do you start? How can you ensure the development of associated skills is a fluid one? It has been found that a good starting point is provided by cut-and-paste work, using packages which offer a number of typefaces or fonts. It is important that children understand the objectives and are clear about who the target audience is for their printed work. Suitable tasks are headings and titles for topic work, posters, 'maxi' books, charts, signs and wall displays for the classroom.

There are at least four wordprocessors for children which offer a variety of fonts ideal for this broad introduction to DTP. *Folio* and *Pendown* have been discussed in past issues of *Acorn User* and each seems to have



ALLERTON NEWS

SECOND EDITION

MAKE YOUR OWN NEWSPAPER

You are going to create a news sheet of your own. You can make your own headlines using the different size prints offered.
This is normal print. THIS IS NORMAL PRINT TOO, BUT USING ONLY CAPITAL LETTERS.

THIS IS SMALL BUT IN CAPITALS To get this press f1

small with no caps looks like this

MEDIUM CAPS

medium no caps

For Medium you press f2.

LARGE

large For this press f3

make a box Use key f4 to make a box. The arrow keys will make your box a big as you wish it to be. You can wipe away a box by using f5. You can join boxes together to make them bigger or to create irregular shapes. This all goes to make the appearance of your news sheet more interesting. Remember, if you make a mistake, or wish to change anything, it is always possible. DON'T PANIC.

LOOK!

You can move from box to box by using SHIFT and the arrow keys. This will also offer you the chance to look at the whole of your page to see what it looks like. You might decide that it looks strange or awkward and wish to change things about a bit. Why not? Don't be afraid to experiment. You can't hurt the computer but it might make you a bit cross now and then.

If you want pictures on your page, you have to leave a space and draw them in later, or use a stuck on picture. You can photocopy the end result.

help? ask.

SAVE ON DISC Do this every so often so that your work is kept safe on disc.

NOW it's your turn

GOOD LUCK!

A teacher's instructions to her pupils

been designed with cut and paste in mind. *Folio* scores with its micro-justification of the text and the varied densities of print. *Pendown* prints in single density, so a new printer ribbon is required for really dark headlines. However, combined with the excellent *Pendown Toolbox* disc, *Pendown* offers numerous fonts in a full range of sizes – almost to the width of the printer paper!

Concept Writer with Printer Fonts and Speech is the latest version of the free (public domain) *Writer*, and offers a wide range of print height and width. An old favourite, *Prompt-3* now also offers these facilities; its excellent manual is packed with suggestions for use.

It may be worth considering typesetting software to provide not only a full range of fonts but also near letter quality (NLQ) text, even if your printer does not support it. An incredible variety of typefaces is possible and generally they are simpler and more convenient than the on-screen composition packages currently available.

For *Wordwise Plus* owners, *Fontwise Plus* will satisfy almost all requirements (12 fonts + 10 additional fonts). For beginners, *Multifont NLQ* from CJE Micros offers simplicity and ease of use without any frills (10 fonts + 27 additional fonts). For overall power *Multi-Font NTQ* from PMS excels (seven fonts + 15 patterns and 24 additional fonts). In addition to a large range of fonts and sizes, backgrounds may also be printed to give borders and lines. However, it takes skill to get the best from this package.

Typesetter! is a recently released package aimed at bridging the gap between simple DTP packages like *Front Page Extra* from MAPE and the more sophisticated AMS *Stop Press* and Mirrorsoft's *Fleet Street Editor*. All these packages have their virtues and each has its supporters and detractors. *Typesetter!*, however, seems to be taking the country by storm because of a couple of main features.

The first is that it is simple and obvious in use – you don't need to train for a couple of hours to get the best from it. The second is that it does not try to be too clever. Many of the more sophisticated packages have so many bells and whistles that it is difficult ever to have an overall understanding of them. *Typesetter!* provides a simple environment in which children – and teachers – can create pages of text in a combination of four print sizes (three headline and one main text).

Up to 64 text boxes may be defined on screen. Each box is an individual wordprocessing environment in which the text may be edited and formatted. There is no attempt in *Typesetter!* as yet to provide graphics and users are encouraged to cut and paste their graphics into the final printout. This facility may be provided at a later stage with an extension disc.

When producing the output to printer, Sherston has thought about the users. Most schools have printers with worn ribbons, and it is possible to instruct the printer to make up to five passes for each line of text. This increases the blackness of print, and probably finishes the ribbon off altogether. Another useful feature is that if your printer supports NLQ print it is possible for the standard text to be printed using this font simply by switching it on at the printer before starting printing. The headline font comes in three different sizes which are sufficient to supply most classroom needs.

Further fonts are being developed and should be released in the near future.

Getting to grips with the package

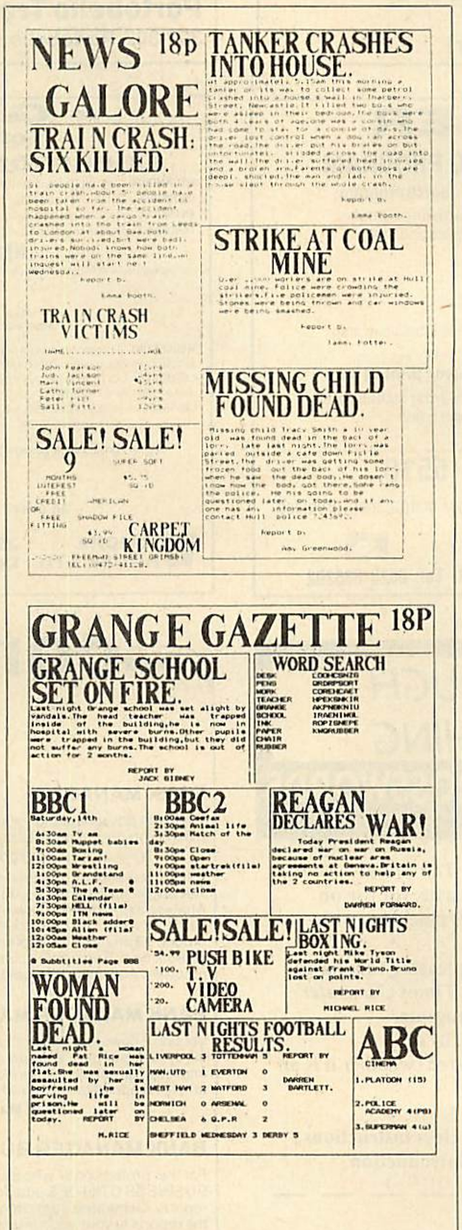
As with any software, the children will have to get used to the way in which it operates. *Typesetter!* is relatively simple in this respect but it will still be important for children to have a working knowledge of all its facilities so that the use of the computer mechanism does not interfere with the main objective – producing a piece of paper. In order to familiarise the class with the package there are many routine tasks which can be undertaken on a rota basis, to provide experience for everyone. A 'cascade' model for this type of exercise works well; that is, the teacher prepares one small group of two or three, who will be present in the first two or three groups using the software. From each group a member will be chosen who will help people in the next session. In this way the training process helps to enhance learning.

Many schools produce a regular menu for the day or for the week, to be displayed at the canteen or posted around the school. This is an ideal regular topic to be tackled using the DTP package. The only disadvantage is that the users are likely to be lumbered with the task for life! The class calendar of events can be provided on a weekly basis and notices of club meetings and events are very easily produced by the pupils concerned. A rota of children who put together a cumulative class diary will produce a fine corpus of work which is a record not only of the class's activities but also of their experience in DTP. This type of work encourages innovation with even the simplest package, and children working in groups will be keen to present their individual offerings in an original format.

The project

Once the children are familiar with the software it is up to the teacher to direct its use as an integrated part of the general class work. By now, pupils should not be treating the package as something special but rather as a normal part of the class resources. It is not the intention of this article to provide a specific topic for development with DTP, but rather to show some of the possible directions in which output from topic work may be steered. The golden rule, as with any computer application, is that if the computer is not appropriate here – don't use it.

Derek Maxted's book explains in detail the arrangements for a school newspaper day in which a school turns over its entire resources to the production to a deadline of as many sheets of copy as possible. This exciting exercise is one which Derek has undertaken on an increasing scale across the country. The rewards for this daring type of enterprise are immense and as an 'in at the deep end' method of learning it takes some beating. The logical successor to this is the production of the entire school magazine using DTP.


NEWS 18p GALORE

TANKER CRASHES INTO HOUSE.

TRAIN CRASH: SIX KILLED.

STRIKE AT COAL MINE

TRAIN CRASH VICTIMS

MISSING CHILD FOUND DEAD.

SALE! SALE!

CARPET KINGDOM

GRANGE GAZETTE 18P

GRANGE SCHOOL SET ON FIRE.

WORD SEARCH

BBC1

BBC2

REAGAN DECLARES WAR!

SALE!SALE!

LAST NIGHTS BOXING.

WOMAN FOUND DEAD.

PUSH BIKE

T.V

VIDEO

CAMERA

LAST NIGHTS FOOTBALL RESULTS.

ABC

The untutored efforts of children from Grange Middle School, Grimsby. The children were presented with *Typesetter!*. Four of them were given a brief introductory 'tour'. They then helped the rest of the class to achieve the end results above. Although the pages are full of errors of various sorts, the children have made efforts to present their ideas readably.

The broadsheet is also a very useful medium for presenting a child's work. A broadsheet aims to convey its message in as rapid and concise a method as possible, rather like the single sheet advertising which arrives through the letter box. A child's skill in presenting a message is greatly enhanced by being constrained by a page, or even by a box within a page.

The beauty of this type of presentation is that the professionalism of the output means that its content gains authority. Thus resource-based learning becomes more effective when the material produced is very readable. The research of each child contributes to the overall school resource for use by future classes. This idea of corporate presentation of aspects of a topic in hand can be developed in the displays used in the classroom. Teachers often use the 'topic web' as a means to express the routes into different areas of the curriculum from the main theme. This can be turned to advantage by presenting the topic as interlinked pages of display on a noticeboard. Each group's contribution is summed up in the broadsheet summary which is central to their area of the board and is surrounded by their work.

Work that ties in to school events is always motivating. The school trip is an obvious source of work, but don't neglect such ideas as sports day, school play, parents' evening and so on. Each of these is usually accompanied by a handout of some sort. That work is better undertaken by the pupils if it can be tied in with the curriculum generally.

Conclusion

The concepts and skills developed using DTP in the classroom include presentation, aesthetic appreciation, conciseness in writing, as well as keyboard and communication-related skills. This is particularly relevant when the DTP package is used by a group who together present their corporate ideas. DTP is here to stay. New machines will make this activity even simpler and children will be encouraged to use the computer as a normal classroom resource.

Typesetter! *(£25.00) is available from Sherston Software, 8 Court Street, Sherston, Malmesbury, Wiltshire SN16 0LL. Tel: (0666) 840433.*

Getting into Print *(£10.00) by Derek Maxted is available from MEDU, Bishop Grosseteste College, Newport, Lincoln LN1 3DY. Tel: (0522) 44713.*

BUSINESS

TAKING THE STRAIN

Still your uses for BBC micros in business come flooding in. Roger Carus surveys the latest set

Your ideas keep coming, six months after the first article in this series appeared (*Acorn User*, April 1987). Letters are still arriving in from home and abroad to join the many we have already received.

I will gladly pass on letters sent via the *Acorn User* office by anyone interested in any items discussed, and I equally welcome any more ideas you may have.

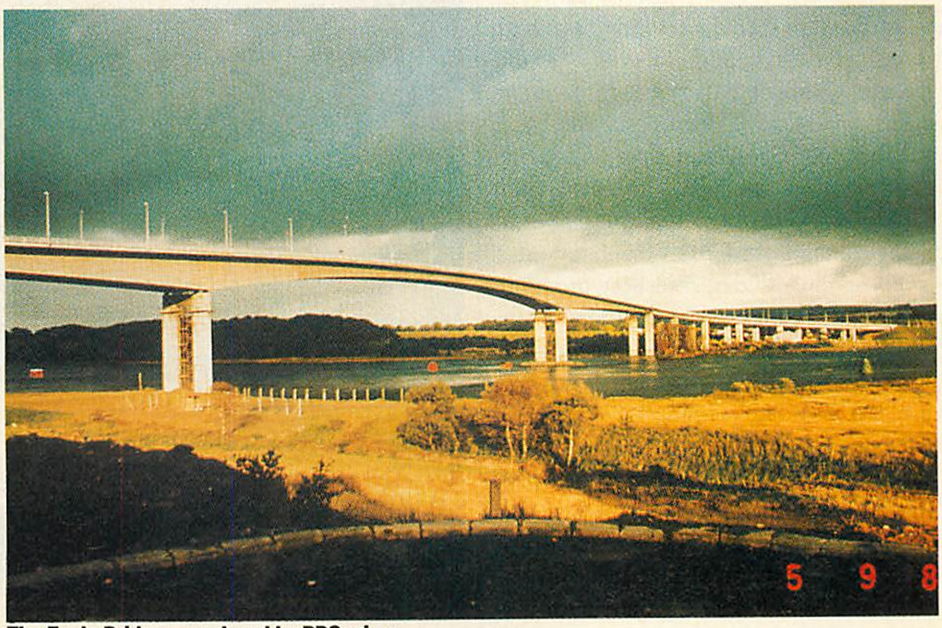
One recurring theme is that many people have good working ideas, but there's no easy way of marketing them. It's difficult to get in touch with those who might have use for a new technique.

A good example of this came from Christopher Hogg in Bodmin, who combines his interest in computing with one in pottery and has developed a suite of programs to help him in his studio. The main routine is designed to work out a glaze recipe from a chemical analysis, handling oxidising and reducing firing conditions in the kiln. And he has another for plotting graphs showing how the temperature of his kiln varies over time.

Christopher has wondered about the program's market potential, but doubts many combine his interests. But it is just the kind of 'real life' software which might be of value to schools and colleges.

A quite different approach is to start with an established market need, and to design products or services to meet the demand. This was the approach taken by Alan and Margaret Wrigley in founding Calderdata of Halifax. Their firm sells *Labelmaster*, which is a program designed to produce high quality printed labels in a range of different formats and colours. They also have a special wordprocessing program to produce a personalised curriculum vitae. This could be of great value to job applicants, and Alan and Margaret believe it is better for the purpose than any standard software. Their sample looks very good. I handle job applications at work, and anything which improves their quality is a boon.

A third common approach is to use the micro to help you solve a problem at work.



The Foyle Bridge – analysed by BBC micro

Many letters have come from readers who've done this successfully.

Dr John Leitch, a civil engineer from Queen's University, Belfast, is involved with a project to monitor bending in a box girder bridge. He needed a system to measure the girder deflection. The technical aspects are complex, but the solution was to link four BBC micros in a network to monitor a laser scanning device. Simple and relatively inexpensive technology to solve an important problem!

At a much lower level of technology, N A Tilston of Warley, and his brother, are concerned with manufacturing small white metal castings. They use *InterSheet* to estimate job prices. A spreadsheet template can be filled in with the job's specifications, and the price is calculated automatically. The template can easily be updated when costs change. The brothers have also written a simple program to produce a payment slip for credit business.

IDEAS WANTED

If you make use of your micro for business or pleasure, and would like to share your knowledge and experience, write to Roger Carus, c/o *Acorn User*, Redwood Publishing Ltd, 20-26 Brunswick Place, London N1 6DJ. Or use British Telecom Gold: 81:RED001.

Much the same sort of approach has been taken by Tim Everard of Lincoln, who showed the firm he works for how it could keep its stock records on *Mini Office II*. This led to using the micro for costings, and then on to wordprocessing, using more sophisticated software. But it has retained its BBC micros, as they are still adequate for the firm's needs.

Not all businesses flourish, and a few end up with debts. Even this situation can be turned to profit as it was shown by Tom Hervey of Acculaw who has developed a program called *Accudebt System* for solicitors wishing to computerise their debt-collection system.

This is a fully professional system which produces the extensive legal documentation quickly and easily. It is already used by four firms of solicitors – it is impressive and an obvious source of big savings.

Calderdata, High Lee, Ludden Foot, Halifax HX2 6LB.

Acculaw Ltd, 13 St Mark's Road, Leamington Spa, Warwickshire CV32 6DL.

FAMILY HISTORY

Rob Macmillan outlines the capabilities of *View Professional* and looks at the background to its development

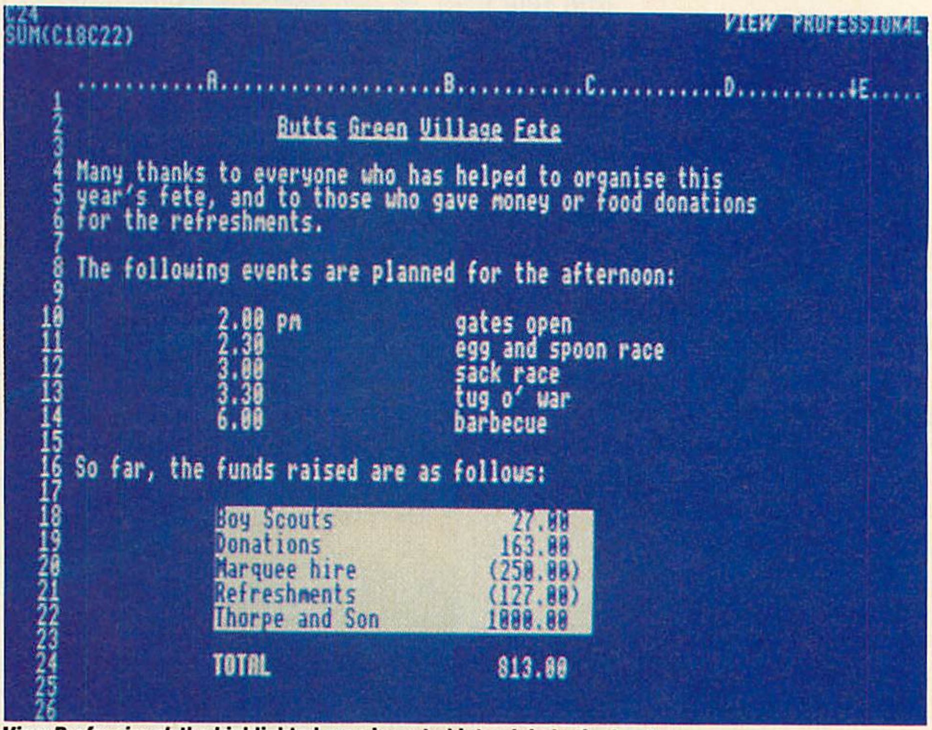
Acornsoft's recently-launched *View Professional* is promoted as a wordprocessor which also includes spreadsheet and database facilities. It could just as easily be regarded as a spreadsheet program with wordprocessing facilities, or even a flexible manager of small databases. In fact, regarded purely as a wordprocessor, it is probably more powerful than *View*, and regarded purely as a spreadsheet program it is at least as powerful as *ViewSheet*. But its distinguishing feature from the many other wordprocessors and spreadsheet programs around is its unique combination of the two. It is a single program with which you can create and edit a document containing both text and 'live' numbers. It has slots, formulae and recalculation of the spreadsheet, it has paragraph formatting, page layouts and mailmerge of the wordprocessor. It is neither one nor the other, and yet it is both at the same time.

But why is Acornsoft producing a new member of the *View* family which competes so much with the two most established and best-selling family members?

Early in the life of the BBC micro, Acorn understood that the BBC could appeal to many different types of user, if only a wide range of software were available for it. Perhaps the most important type of software was what we now call 'personal productivity' software – wordprocessors, spreadsheet programs and database management systems. With this in mind, Acornsoft started the *View* project in 1982, to provide these applications on the Beeb.

In the old days

It is worth recalling how the world looked at that time. Sales of the BBC micro were taking off as its potential for home, scientific and educational usage was being realised by the public. In the business area, at that time there were no IBM PCs in Britain; Commodore computers, CP/M machines and the Apple II, all based on eight-bit microprocessors and 48-64k RAM, were the standard. *WordStar*, *VisiCalc* (the original spreadsheet) and *dBase II* were the market leaders in the software world. Meanwhile, the BBC micro was only just starting to acquire disc drives. Of course, nowadays many of us take floppy discs for granted, but back then 800k dual drives were hard to get, slow, noisy and about £800, twice the cost of the computer!



View Professional: **the highlighted area is sorted into alphabetical order**

Serious personal productivity software first arrived in the autumn of 1982 in the form of *Wordwise* from Computer Concepts. Acornsoft countered this with *View* version 1.4 in the spring of 1983, and the rivalry between the two companies and groups of supporters started. In early 1984 BBC Soft launched *UltraCalc*, the first acceptable spreadsheet program for the BBC micro, and this was followed in the summer of 1984 by Acornsoft's *ViewSheet*. These were some of the first application programs to appear in sideways ROM form, giving greater speed and ease of operation but also causing a few supply difficulties for the manufacturers!

In May 1985, it became clear which companies were running in the race to provide the 'integrated systems' the market was by now demanding. Computer Concepts announced the ROM-link series and started to sell *InterSheet*. But neither *Wordwise* nor *Wordwise Plus* were part of ROM-link and the market had to wait some time for the other three applications. Acornsoft was able to counter this with the launch of *ViewStore*, and so had all three main applications of wordprocessor, spreadsheet and database on sale first, with spelling checker and graphics to come.

The race was over

By mid-1986 the race was just about over with *View* and *ViewSheet* as standard in the Master 128, the rest of the *View* family available and all of the ROM-link except for *InterBase* available. In a sense both companies won since both had firmly established their ranges of software and both had many devoted users in the market. Both companies claim that their software is unique there are far more similarities than differences. Meanwhile at Acornsoft, there were more developments behind the scenes.

It became clear that the first major new developments should be families of applications which could pass data between members. But with products which could do this already in the pipeline, what could be done next? There seemed to be three possibilities:

- Retain the family concept, and develop each member to make it more powerful or easier to use.
- Strengthen the bridges between applica-

tions, making it easier to pass data from one type of application to another.

- Develop a new type of program, making the old families obsolete.

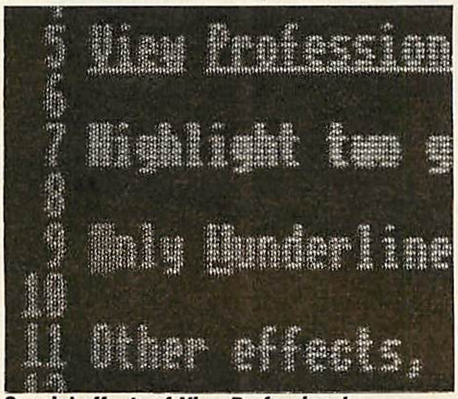
The first two options were already being followed by a number of software suppliers. In the IBM PC world similar families were springing up before giving way to the immovable giants *WordStar*, Lotus *1-2-3* and *dBASE*. It seemed that both Lotus and Ashton-Tate had taken the first two options to their conclusion when they released *Symphony* and *Framework*; each is a single package covering wordprocessing, spreadsheet, database and charts. You can call up new windows or frames when a new application is needed. A complete document say, a business report, is built by stringing the windows or frames together. However, you have to keep switching between application, no matter how invisibly they are joined. And you must divide the document into several sub-documents of different types.

A single program

View, *ViewSheet* and *ViewStore* had all been written for Acornsoft by Mark Colton who worked for Protechnic Computers, a Cambridge software house. In early 1985 Colton left Protechnic to start his own company, and to work on the third option. His idea was to create a single program which could replace wordprocessors and spreadsheets and perhaps combine some database elements too. With backing from Acornsoft, he developed the program that became *View Professional*, and ultimately *PipeDream* for Clive Sinclair's Z88 portable computer.

The original idea was that the traditional (it was at least six years old by now!) distinction between textual document and numerical spreadsheet was artificial. Wordprocessors could create only text and spreadsheets were for numbers, but many everyday applications required both. The family solution was that you write your text in your wordprocessor, you perform your calculations in your spreadsheet, and then you 'cut' out a piece of spreadsheet and 'paste' it into the text. But this approach has two problems. First, it is fiddly. Second, and worse, the spreadsheet fragment that is pasted into the text is no longer 'live', meaning that it cannot be recalculated. When the spreadsheet needs updating the numbers pasted into the text don't change automatically.

So the first requirement for the new super program would be the ability to perform both text and spreadsheet operations on a document without the need for cut and paste. A second requirement would be that compared to existing wordprocessors and spreadsheet programs, neither wordprocessing nor spreadsheet power should be compromised so that



Special effects of *View Professional*

users would feel they were losing any facilities. Judged purely as a wordprocessor or a spreadsheet it should compete with the best. It should have sort and search operations so that it could replace dedicated database programs for small database applications. A high degree of on-screen formatting was necessary to keep to a minimum the time required to create the final document. On top of all this, compatibility with existing software was desirable, wherever possible, so that documents could be transferred from existing *View* applications. Finally, the user interface should be easy to learn for existing *View* users, but configurable for other users.

The solution Colton came up with has an underlying spreadsheet structure, on top of which text can be written and edited. The usual spreadsheet columns and rows are available at all times. Page breaks are visible on screen, unless explicitly switched off, and respond immediately to changes caused by editing the document. Simple highlights – bold characters and underlining – are also visible whilst editing. Documents can be larger than the available RAM, by creating disc-based multi-file documents, and many global operations such as printing and searching can treat all the linked files together. In addition all the editing operations and commands, from simple cursor movements to complex sort operations, can be configured to any combination of keyboard strokes, enabling you to build your own command interface or foreign character sets.

This model satisfies many goals. If you wish, you can think of *View Professional* as a pure spreadsheet program or as a pure wordprocessor. Indeed this article was written on *View Professional* purely as a wordprocessor. Spreadsheet fragments can be alternated with paragraphs to produce 'live' reports where the totals change if you alter a number. But the merging of the two concepts opened new horizons. Since a flow of text exists within a single column (although it can overlap onto other columns) multi-column text is available almost as a by-product. In fact up to 42 columns of text can be maintained – each independently formatted. And since slot references can be included inside text, paragraphs can suddenly handle 'live' dates, sales totals and portfolio profits within the text. Complex financial models can be created with explanatory text typed in as an integral part of the model, rather than tacked on as an afterthought. Smaller calculations can be turned into memos or letters at the drop of a paragraph.

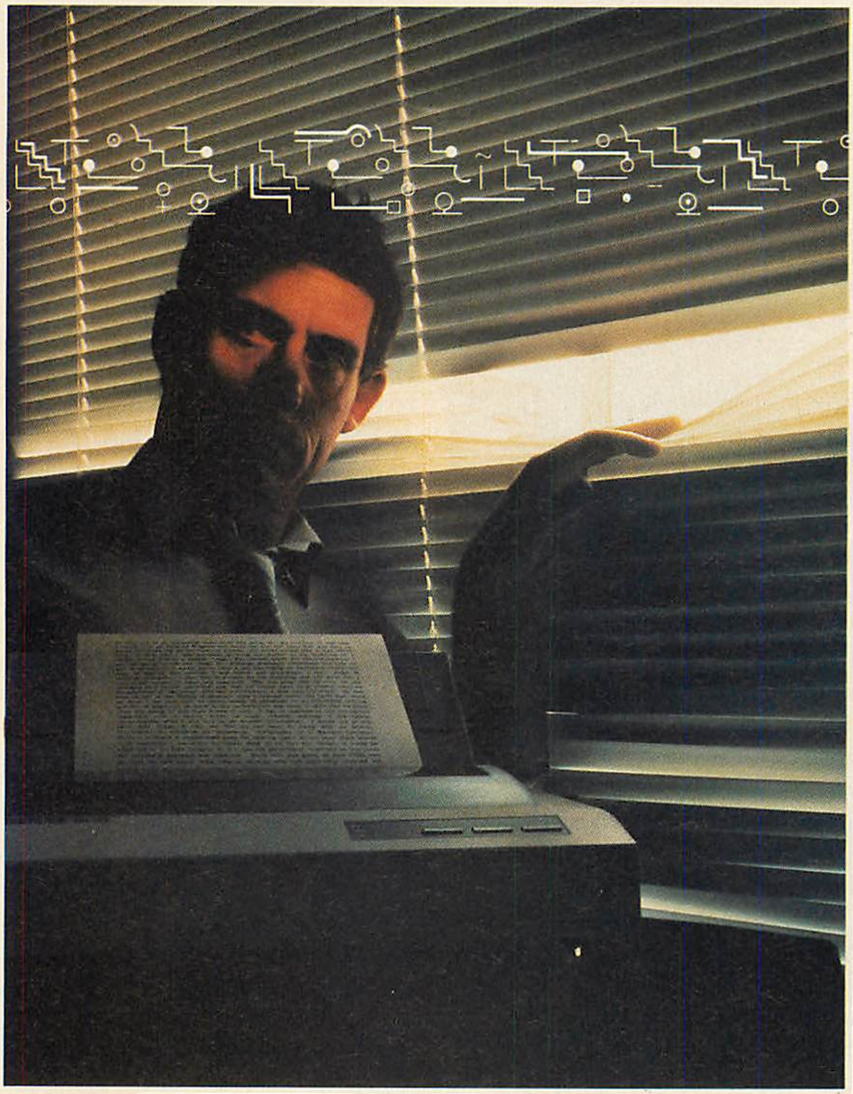
A 'word sheet'

Colton has managed to incorporate the bulk of editing facilities from both *View* and *ViewSheet* to create the full-blown 'word sheet'. Extra spreadsheet operations not available in *ViewSheet* have added, including date manipulation and a powerful indexing function. The result is a program which seems to do away with the need for separate wordprocessors and spreadsheets – it is a single entity and there's no need to cut and paste.

To all intents and purposes *PipeDream*, supplied with Clive Sinclair's Cambridge Computer Z88, is a direct translation of *View Professional*. Cambridge Computer advertises connecting cables and software to transfer data files from *PipeDream* to the IBM PC in both Lotus *1-2-3* and *WordStar* formats. There is also a connecting cable and software to connect with the BBC micro. *PipeDream* and *View Professional* share exactly the same data file format, and so text or financial models created on one can be immediately loaded into the other to be edited or printed.

In this way the BBC micro and the new Z88 complement each other, rather than compete, particularly since a version of BBC Basic is also bundled with the Z88. The BBC is a more suitable machine for use in the office, school or home with large screen display, disc drives and printers. But you can't get your BBC micro in your briefcase or use it on the train.

View Professional *is available from Acornsoft, 645 Newmarket Road, Cambridge CB5 8PD, and costs £100 including VAT.*



THE COMPATIBILITY QUESTION

Graham Bell has been monitoring readers' experiences with the Master 512

For Master 128 owners, the 512 co-processor looks an attractive way of running IBM PC software. However, as this and the Master 512 use not MS-DOS but the rival DOS Plus, and the hardware is very different to the PC's, doubts hang over exactly how compatible they are. In August we asked readers to tell us how they were getting on with the Master 512.

Wordprocessors are among the least demanding of programs. The large selection of PC wordprocessors mostly work well with the 512 co-processor. No reader reported any problems with *WordStar* or *SpellStar*, although the Amstrad version, *WordStar 1512*, won't run.

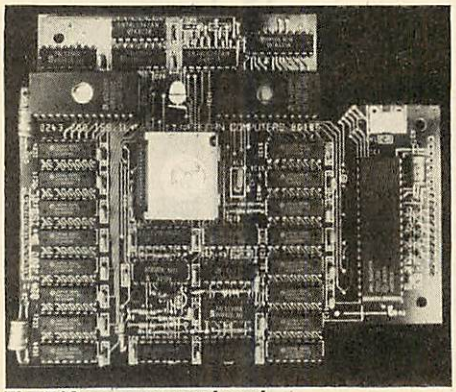
Similarly, *Multimate*, versions of *Volkswriter* and *GEM Write* all worked without problems. There were varied responses concerning *PC-Write*; some copies clearly worked, but Alan Edmondson of County Antrim reported that versions 2.55 and 2.7 work only in insert mode.

Readers fared badly with Microsoft *Word* and with *1st Word Plus*. Philip Hill of Ipswich also confirmed the unsuitability of *PC-Outline*; he had trouble with the scroll key, macros and the disc utilities.

The most widely used PC applications in business include the *Lotus 1-2-3* spreadsheet and versions of *dBase*, the database system. Whether these work on the Master 512 is not really dependent on the software – disc protection is the problem.

Several readers agree that protected versions of Lotus *1-2-3* do not work, but unprotected copies of version 2 are available and these are compatible with the Master 512. Even the graphs and charts produced by *1-2-3* can be used. Other spreadsheets that can be used include *Supercalc*, *PC-Calc* and Grafox' *Logistix*.

Unprotected copies of *dBase II*, *III* and *III+* are all compatible with DOS-Plus and the 512 co-processor. Ian Whiting of Bedford has used *dBase III+* extensively, and he reports a minor limitation. The Master 512 can hold fewer files open than MS-DOS and the IBM PC, which may be important for particularly complex databases. The Borland *Turbo Reflex* database also seems to be compatible. Neither Lotus *Symphony* nor Ashton-Tate's *Framework* will run on the Master 512. The only similar package which readers reported to run is Migent *Ability*.



The 512 co-processor board

Programming languages

Although bundled with a selection of *GEM* software, the Master 512 is supplied without any 16-bit programming language. Of course, you can switch off the co-processor and use the Basic of the BBC micro.

A version of BBC Basic is available to run on the PC and on 512 co-processors. BBC Basic (86) by M-Tec is widely reported to run well. But as it was written for the PC, it lacks the graphics and sound features of the Acorn versions. This is true of almost all the programming languages here. An enhanced version of BBC Basic specially for the 512 is being developed by M-Tec.

Other versions of Basic fare less well. Readers have had some success with the Microsoft Quick Basic compiler, but others report problems. Borland Turbo Basic works for just a few minutes, allowing the nimble-fingered to type in and compile small programs. But it invariably soon crashes the machine. Alan Edmondson claims that various versions of Microsoft GW Basic run, but he has some problems with loading and saving data.

The other popular languages among those who wrote in are C and Pascal. Readers report no problems with Aztec C Prime, and several say that the good value Zorland C works well, in both its original and version 2 forms. As Dr Ronald Alpair of Dorset pointed out, some versions will compile only from within the Zorland editor, but this problem is not limited to the Master 512. Borland Turbo C also works well, the only limitations being that of the 512 screen. For example, there is no facility for multiple coloured windows.

Pascal programmers use Borland Turbo Pascal almost exclusively, and many report that this is compatible with the 512. Graphics are well supported with this language, through the separate Borland *Graphics Toolbox*. R Shrubsall sent in times for the new PCW benchmarks showing Turbo Pascal on the 512 to be about four times faster in calculation than on an IBM PC, but text display was slower.

Fortran compilers are also available for the 512. Lawson Wakefield of Stafford has tested three, and reports that both Prospero Fortran and Fortransoft F77 are compatible, but Ryan McFarland Fortran 77 is not.

One point to watch when buying a compiled programming language is that you may also need a linker program. Many compilers don't produce a runnable program; the linker modifies programs so they can be run. MS-DOS comes with its own linker, but DOS Plus does not.

Among those who replied, there is a fair degree of agreement about what runs and what doesn't. But it is clear that even a seemingly simple package may have hidden problems. The Microsoft *Flight Simulator* version 2.12 runs on the 512, but Ian Whiting points out that the later version 2.13 stops after displaying the title page. You should still see the program running before you buy, or make it clear to the dealer which machine it is to be used on.

One vital point is that the 512 system uses several different disc formats. PC discs are usually formatted to store 360k of data, but DOS Plus also uses its own format. But beware, some PC disc utilities are designed only for 360k discs, and can corrupt discs using other formats, and destroy your files.

It is also important to get the latest DOS Plus system discs for your Master 512. A number of packages are 'more compatible' with the new versions, among them *Ability*, *Volkswriter*, Lotus *1-2-3 and Supercalc*. The new discs are available from Acorn if you return your original system discs, price £10.

Many thanks to all those who have written in detailing their experiences with DOS-Plus. If you have anything to add, then do write in – we hope to publish a further 512 update in the future.

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ACORN USER'S

DIARY

One man and his laptop

Who should you choose to endorse your nice new laptop computer? This is one of many problems that faced Sir Clive Sinclair as he prepared to launch the long-awaited Z88 and relaunch his own career.

Evidently a great deal of lateral thinking went into the choice. Ace reporter Orson Fact and the assembled hacks were locked (yes, really locked) into a darkened room in London's Waldorf Hotel and treated to a gushing exposition by actress and one-time Dr Who sidekick, Lalla Ward.

Despite her evident profound ignorance of all computing matters, she confided she just knew the Z88 was 'absolutely wonderful' and that it made her proud to be British. Presumably chasing low-budget aliens across time and space qualifies you for this kind of thing.

Lalla went on to liken the Z88 to her former home, the Tardis. Not, one hopes, as an indicator of its reliability and ease of use.

When the last hack had given in, and admitted that with the Z88 no other computer was necessary and compatibility was an irrelevance, Orson was shown lots of pictures of PR people finding uses for Z88's in unlikely situations. Should sales fall off, it will apparently be supplied free with all Barbour jackets. But unlike the ill-fated C5 it is the wrong shape to become a flowerpot in trendy wine bars.



For the well-dressed farmer and inter-galactic traveller

Zander is here at last

The October issue's scheduled one-line game was hit by legal wrangles. After an acrimonious court drama, charges of piracy and software theft have eventually been dropped, but Abuser has been forced to agree 'to substantially alter the look and feel' of its game.

The object is to fly your $-shaped craft over a tundra landscape dotted with stunted pine trees. The game was originally to be called *Arctic* but Acorn is claiming rights to all words beginning with 'A'. Renamed *Zander*, release had to be put off for a month to allow time for new cassette inlays to be printed. Here it is.

```
     10 MO.7:F.I=0TO
 10:V.31,10-I,9+I,4
 7,31,29+I,9+I,92,3
 1,9-I+RND(19+I),9+
 I,94:N.:X=20:Y=5:H
 =2:REP.V=&7D68+X+4
 0*Y:s=?V:?V=-1:V=V
 -40*INTH:f=?V:?V=3
 6:K=?&EC:X=X-(K=19
 4)+(K=225):Y=Y-(K=
 232)+(K=200):?(V+4
 0*INTH)=s:A=A-.01-
 (K=201)/20:H=H+A:?
 V=f:U.H<0
```

To run the program, type AUTO, then enter it carefully, pressing Return only at the very end. Then save it, and type RUN. Return is thrust, Z and X are east and west,: and / north and south. The craft's shadow and the effects of gravity are fully depicted.

In fact, this is only a demonstration of part of the full game, *Lurch*, to be released early next year.

Return of Mad Alex

Our own Mad Alex, exdenizen of the Redwood dungeon, featured in a recent *Sunday Telegraph* exposé of computer hacking. 'There is a problem with many programmers,' he says. 'A lot of them are very weird indeed, and they can barely talk to other people.' But Alex has his own eccentricities, reported in the Telegraph. These centre around his nine-inch ponytail and 'vigorously striped' trousers.

On the move

Acorn User has moved from its cramped Covent Garden offices to different cramped offices. Our new address is *Acorn User*, Redwood Publishing Ltd, 20-26 Brunswick Place, London, N1 6DJ.




Setting the Scene



Going round the bend at Misano (BBC MICRO VERSION)



Knocking off an opposing rider (BBC MICRO VERSION)



Clever Electron progamming techniques (ACORN ELECTRON VERSION)

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Howling round the bends at Le Mans at 150 m.p.h. is a daunting experience. You'll need nerves of steel and slick reflexes to finish in the Top 6 and qualify for the next race. If, at first, you can't make the grade you can always let off steam (and gain bonus points) by bumping into the other riders and knocking them off their bikes; listen for the terrified wail as the rider is sent flying to the ground.

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An enhanced version has been specially produced for owners of the BBC Master Series computers. Included free with all BBC Micro cassettes and discs, this version features several extra race circuits, a beautiful 6-minute musical soundtrack, and a host of extra game features — making full use of the Master's extra memory and capabilities.



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